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**EDGEWOOD ARSENAL
TECHNICAL REPORT**

FATR 4626

**ATLAS OF GOAT ANATOMY
PART II: SERIAL CROSS SECTIONS**

by

Clarence E. Hopkins, Sr.
Thomas E. Hamm, Jr., CPT, VC
Gary L. Leppart

April 1972



**DEPARTMENT OF THE ARMY
EDGEWOOD ARSENAL
Biomedical Laboratory
Edgewood Arsenal, Maryland 21010**

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14. KEYWORDS <table border="0"> <tr> <td>Atlas</td> <td>Angora goat</td> </tr> <tr> <td><u>Capra hircus</u></td> <td>Serial cross sections</td> </tr> <tr> <td>Embalmed</td> <td>Nomina Anatomica Veterinaria</td> </tr> <tr> <td>Meat cutting saw</td> <td>Key figure</td> </tr> <tr> <td>Cannula</td> <td>Carotid artery</td> </tr> <tr> <td>Jugular vein</td> <td>Deep freeze</td> </tr> </table>				Atlas	Angora goat	<u>Capra hircus</u>	Serial cross sections	Embalmed	Nomina Anatomica Veterinaria	Meat cutting saw	Key figure	Cannula	Carotid artery	Jugular vein	Deep freeze
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Biophysics Division

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Task 1T061101A91A15

DEPARTMENT OF THE ARMY
EDGEWOOD ARSENAL
Biomedical Laboratory
Edgewood Arsenal, Maryland 21010

FOREWORD

The work described in this report was authorized under Task 1T061101A91A15, In-House Laboratory Independent Research. This work was started in September 1965 and completed in February 1971.

In conducting the research described in this report, the investigators adhered to the "Guide for Laboratory Animal Facilities and Care," as promulgated by the Committee on the Guide for Laboratory Animal Resources, National Academy of Sciences-National Research Council.

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DIGEST

The angora goat (Capra hircus) has been the main experimental animal used by the Biophysics Division for many years. Knowledge of goat anatomy is important in both the planning and experimental stages of projects. Because no readily usable information on goat anatomy is available, a series of reports on the subject is being prepared. The first in the series described the skeletal anatomy. The present report contains serial cross sections of the angora goat. Part III, Myology, which will describe the muscles on superficial and deep dissection of the head, neck, pectoral, and pelvic limbs, is near completion.

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ATLAS OF GOAT ANATOMY

PART II: SERIAL CROSS SECTIONS

I. INTRODUCTION.

The angora goat (*Capra hircus*) has been the main experimental animal used by the Biophysics Division, Edgewood Arsenal, Maryland, for many years. Knowledge of goat anatomy is important during both the planning and experimental stages of projects. Because no readily usable information on goat anatomy is available, a series of reports on the subject is being prepared. The first in the series¹ described the skeletal anatomy. The present report contains serial cross sections of the angora goat. Part III, Myology, which will describe the muscles on superficial and deep dissection of the head, neck, pectoral, and pelvic limbs, is near completion.

II. MATERIALS AND METHODS.

A polyethylene cannula (0.106-inch ID and 0.138-inch OD) containing a plug was placed in the jugular vein of an uncastrated adult angora goat and the animal was anesthetized with pentobarbital sodium. The goat was then suspended in a metal frame by ropes attached to the horns, tail, and nuchal ligament with its feet just touching the floor of the frame (figure 1). [This was done so that later the goat, suspended in the stand, could be frozen in that position (figure 2). Cross sections from an earlier castrated goat, frozen while lying on its side, were distorted and had to be discarded.]

The goat was then exsanguinated through an additional cannula placed in the carotid artery on the opposite side of the neck. As blood flow ceased, the carotid cannula was connected to a large funnel which was suspended several feet above the goat and contained 1% gum arabic solution. The plug in the jugular cannula was removed, and the animal was perfused through this gravity flow system with 12,000 ml of the gum arabic solution until the fluid coming out of the jugular cannula was clear. Then 12,000 ml of 10% formalin solution was allowed to flow slowly through the system until the exiting fluid had a distinct formalin odor.

The goat remained in the frame at room temperature until the next day. At that time, 250 ml of red latex was injected into the carotid artery via the cannula and 300 ml of blue latex was injected into the jugular vein. The cannula plugs were replaced and the animal was placed in a deep freeze. After 5 days, the goat was removed and sectioned longitudinally, beginning at the anterior end, at 1-inch intervals (54 sections) with a meat cutting saw. Each section was photographed, and drawings were made from the photographs.

A "key figure" for reference was drawn and marked in 1-inch sections (figure 3).

Another castrated adult male angora goat was prepared in the same way as the first and sectioned at the median plane. The labeled photograph is shown in figure 4. The drawings of the 54 longitudinal cross sections follow figure 4.

The nomenclature prescribed in *Nomina Anatomica Veterinaria*² was used for labeling the drawings. The anatomy books of Sisson and Grossman³ and May⁴ and the excellent book by Miller⁵ were also used as references during preparation of this atlas.

¹Hopkins, Clarence E., Sr., Hamm, Thomas E., Jr., and Leppart, Gary L. EATR 4431. Atlas of Goat Anatomy. Part I. Osteology. September 1970. UNCLASSIFIED Report.

²*Nomina Anatomica Veterinaria*. Department of Anatomy, New York State Veterinary College, Ithaca, New York. 1968.

³Sisson, S., and Grossman, J. D. *Anatomy of Domestic Animals*. 4th Ed. W. B. Saunders Company, Philadelphia, Pennsylvania. 1953.

⁴May, N. *Anatomy of Sheep*. 2d Ed. University of Queensland Press, Wilke Company, Australia. 1964.

⁵Miller, M. E., Christensen, G. C., and Evans, H. E. *Anatomy of the Dog*. W. B. Saunders Company, Philadelphia, Pennsylvania. 1964.

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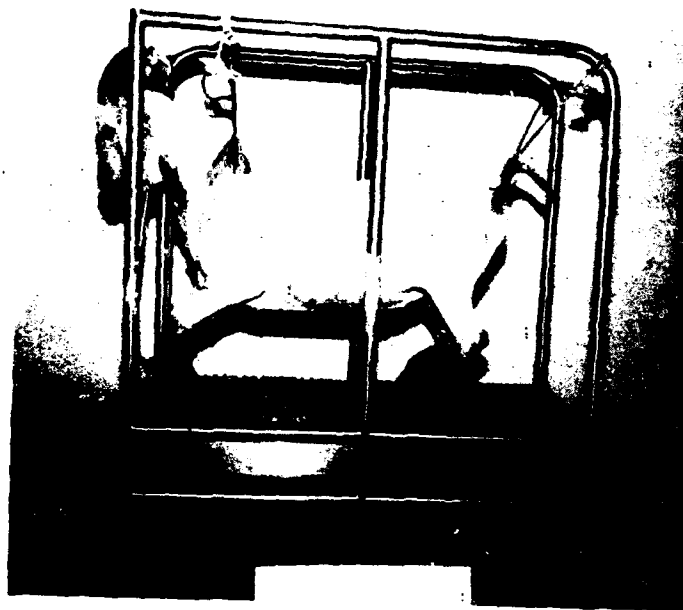


Figure 1. Goat Suspended by Rope in Metal Frame

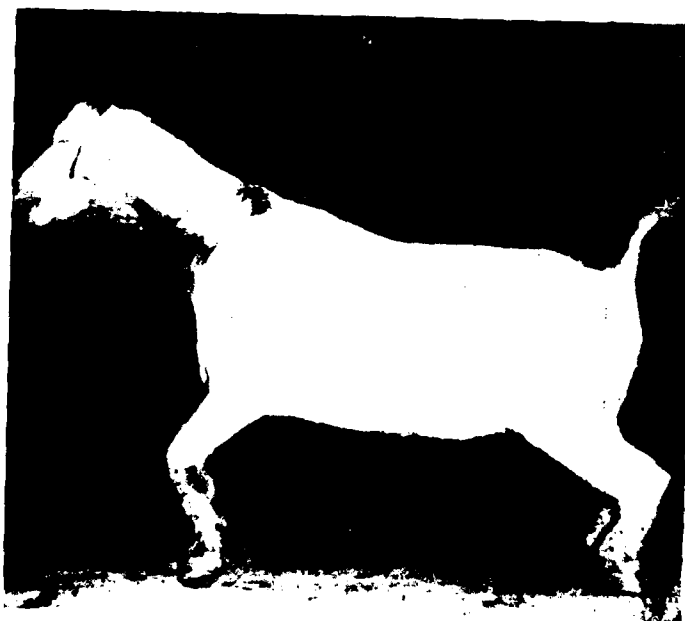


Figure 2. Embalmed Goat in Standing Position

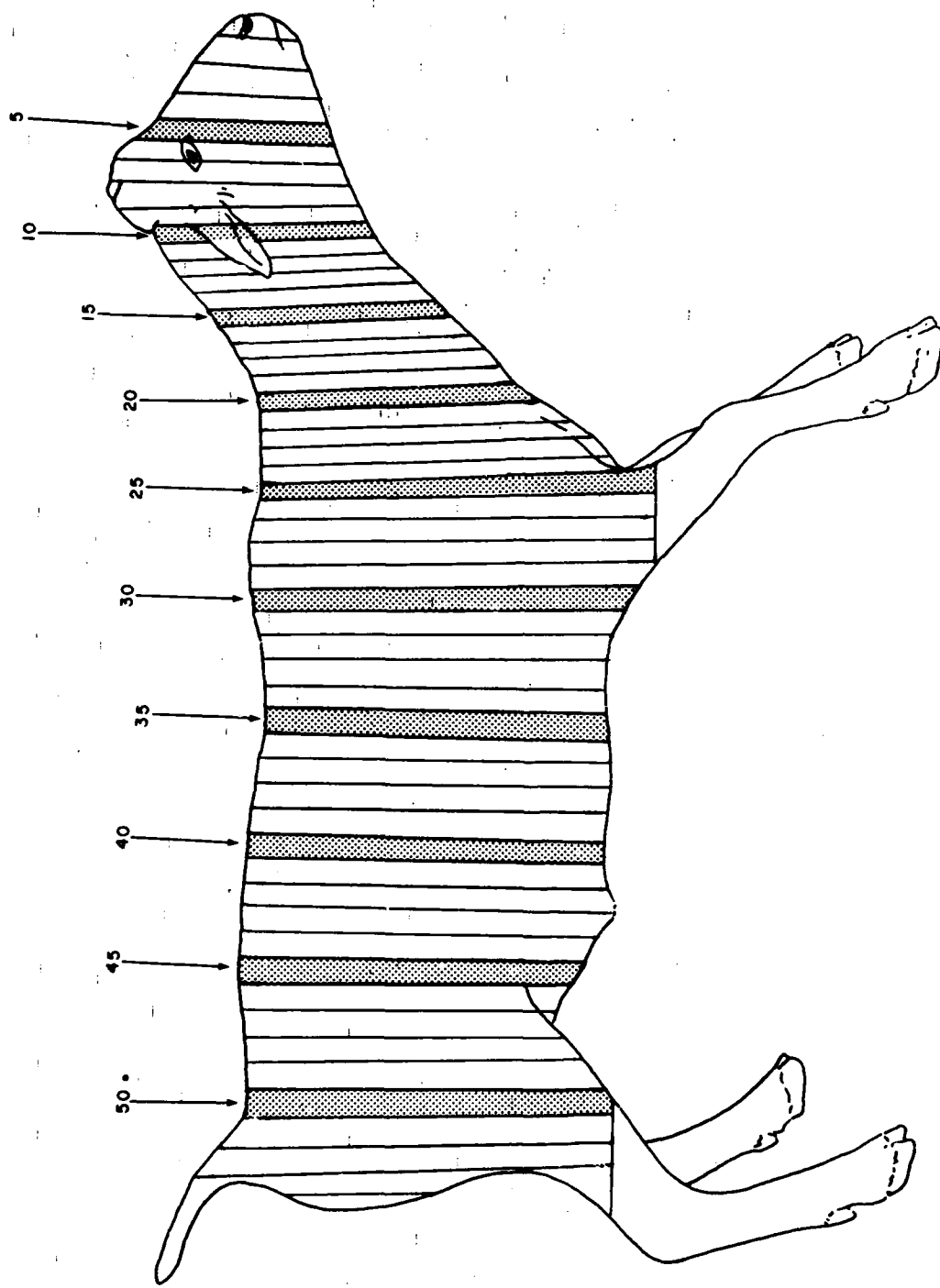
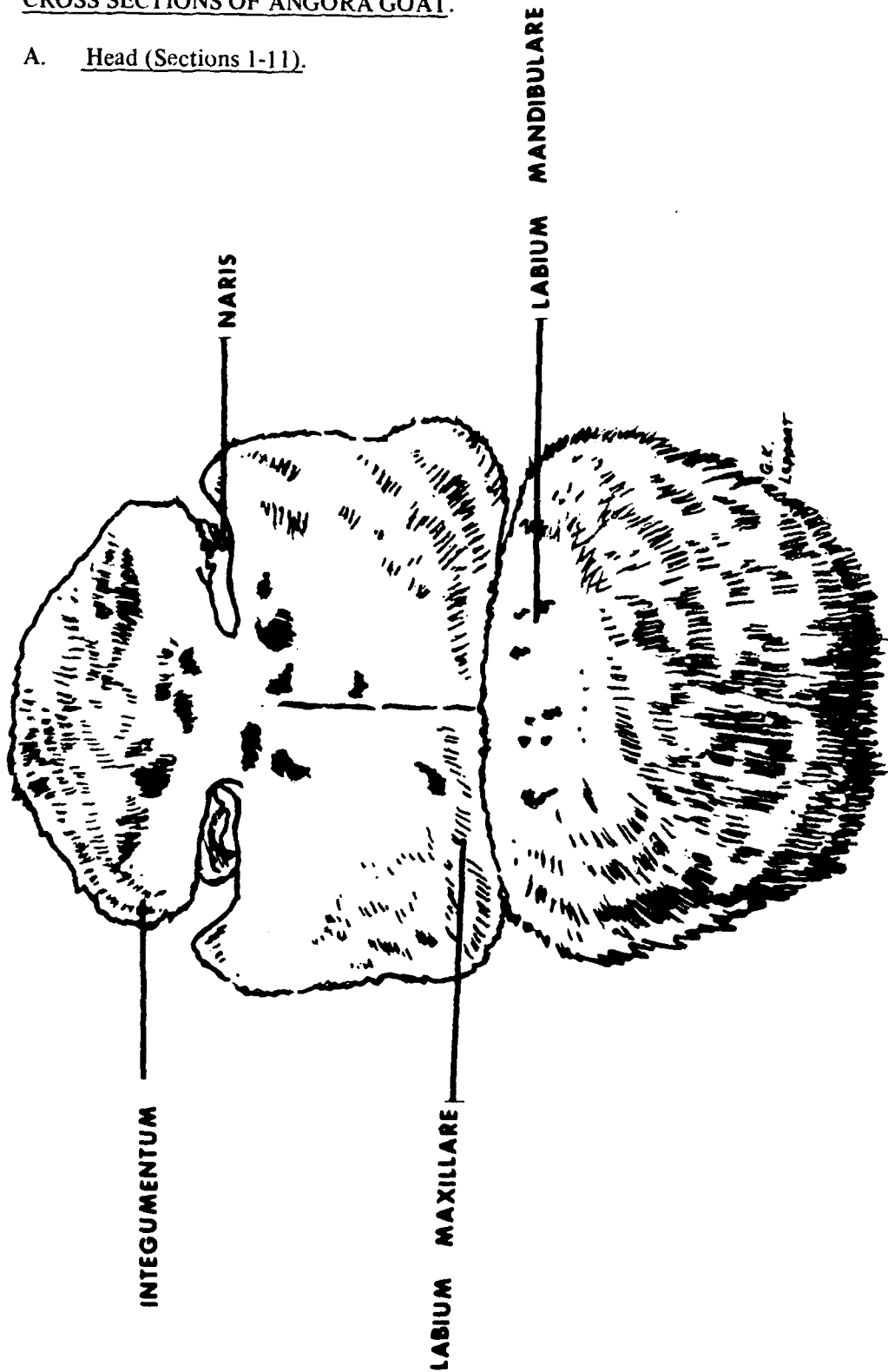


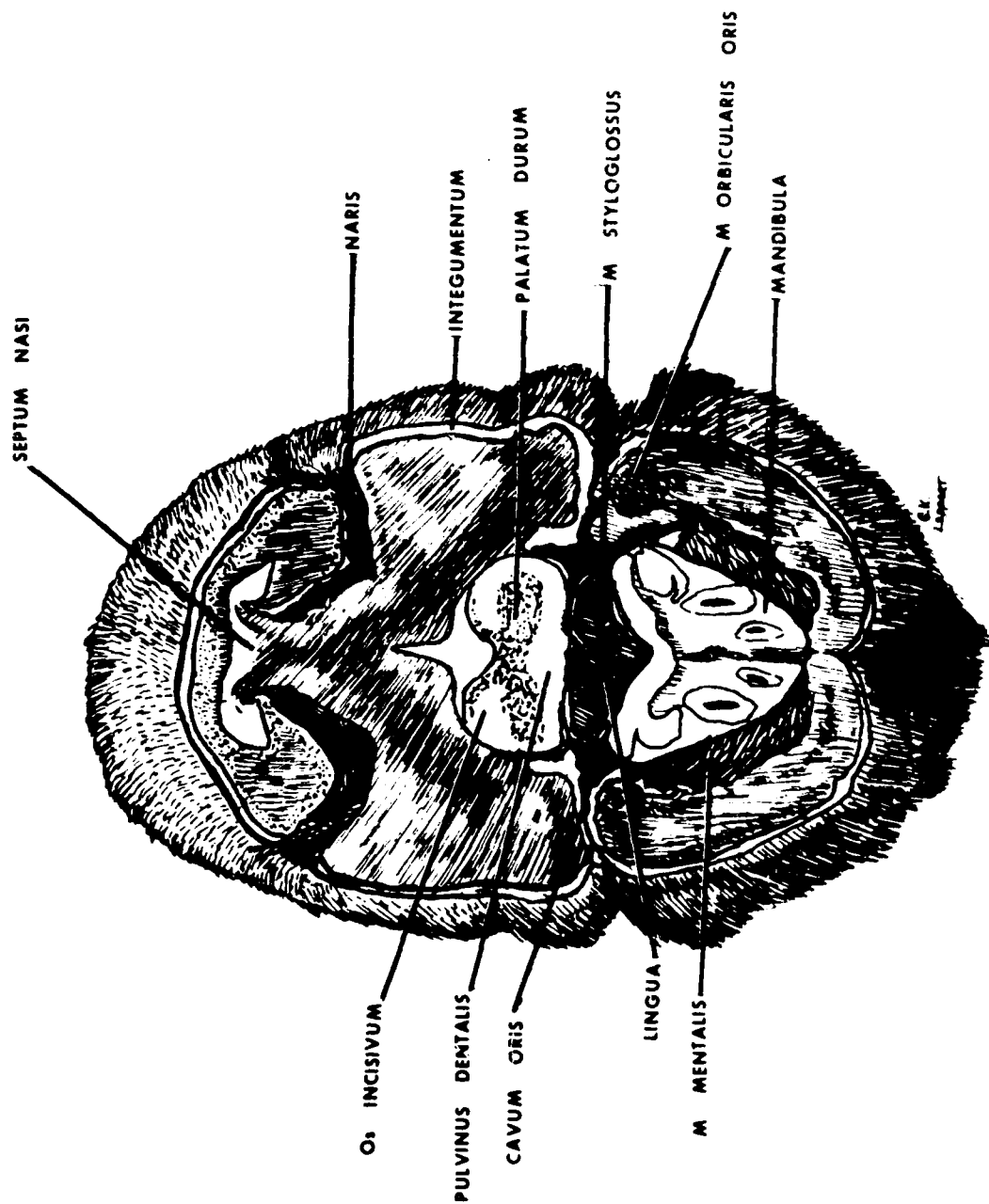
Figure 3. Key Figure: Cross Sections

III. CROSS SECTIONS OF ANGORA GOAT.

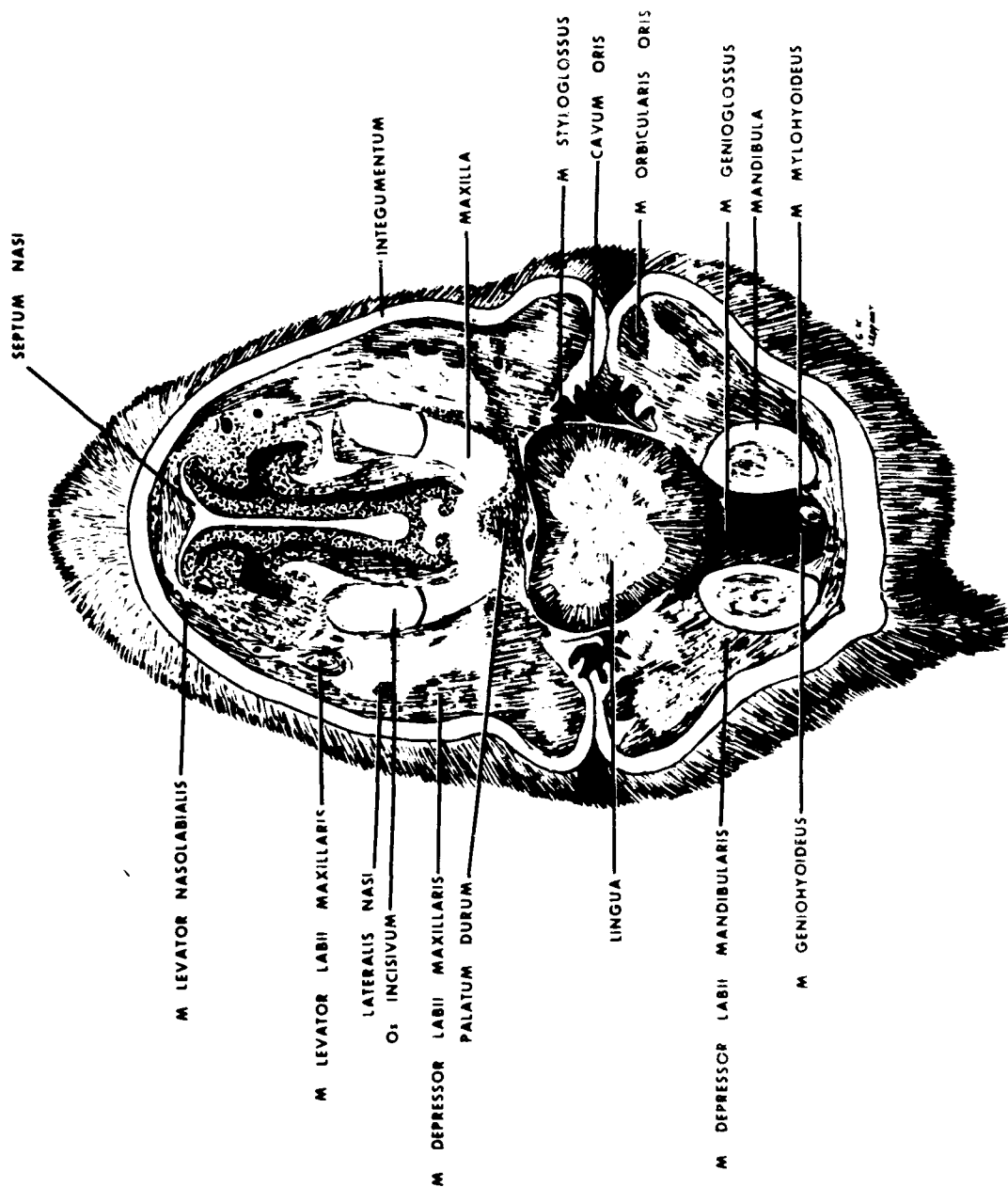
A. Head (Sections 1-11).



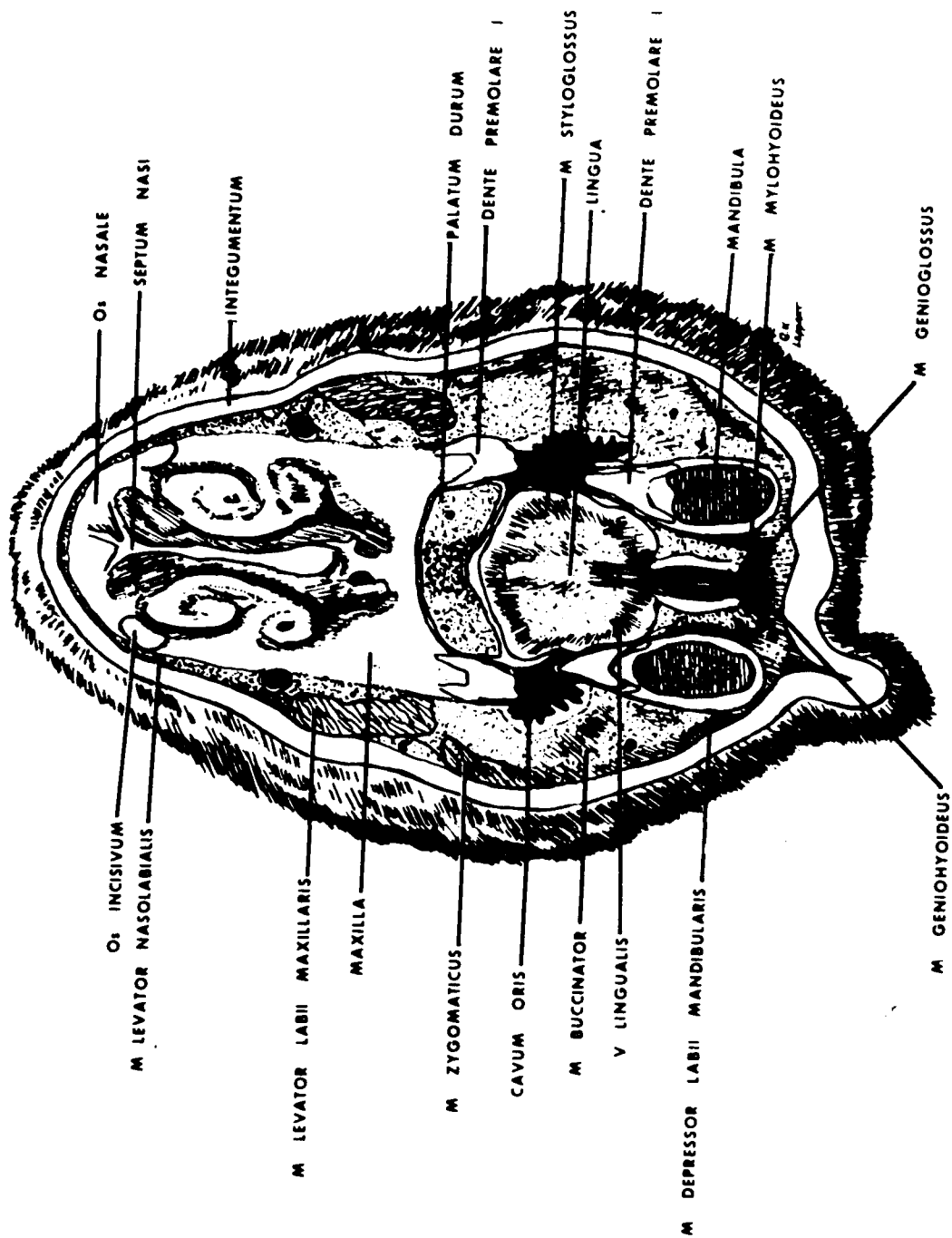
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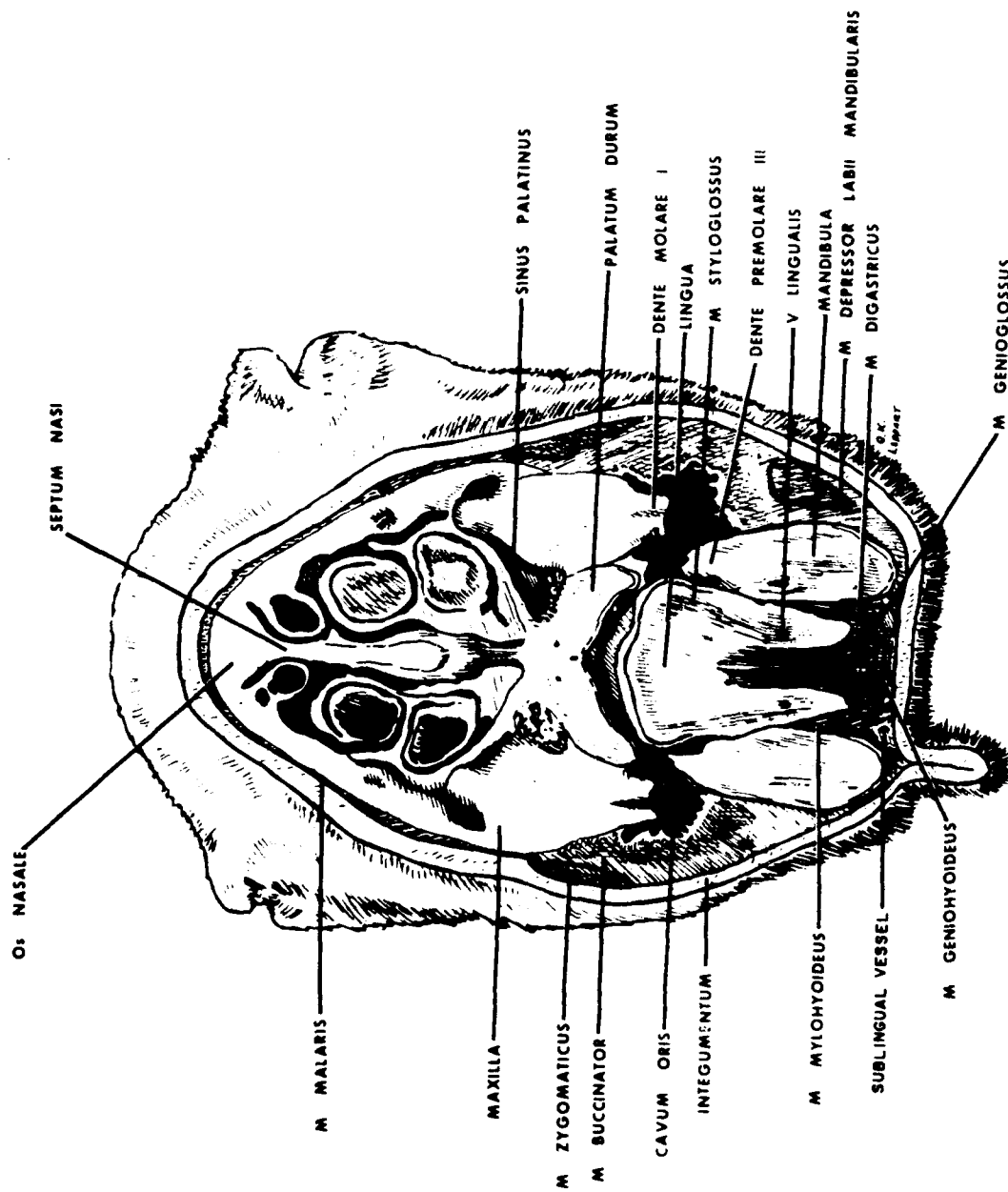
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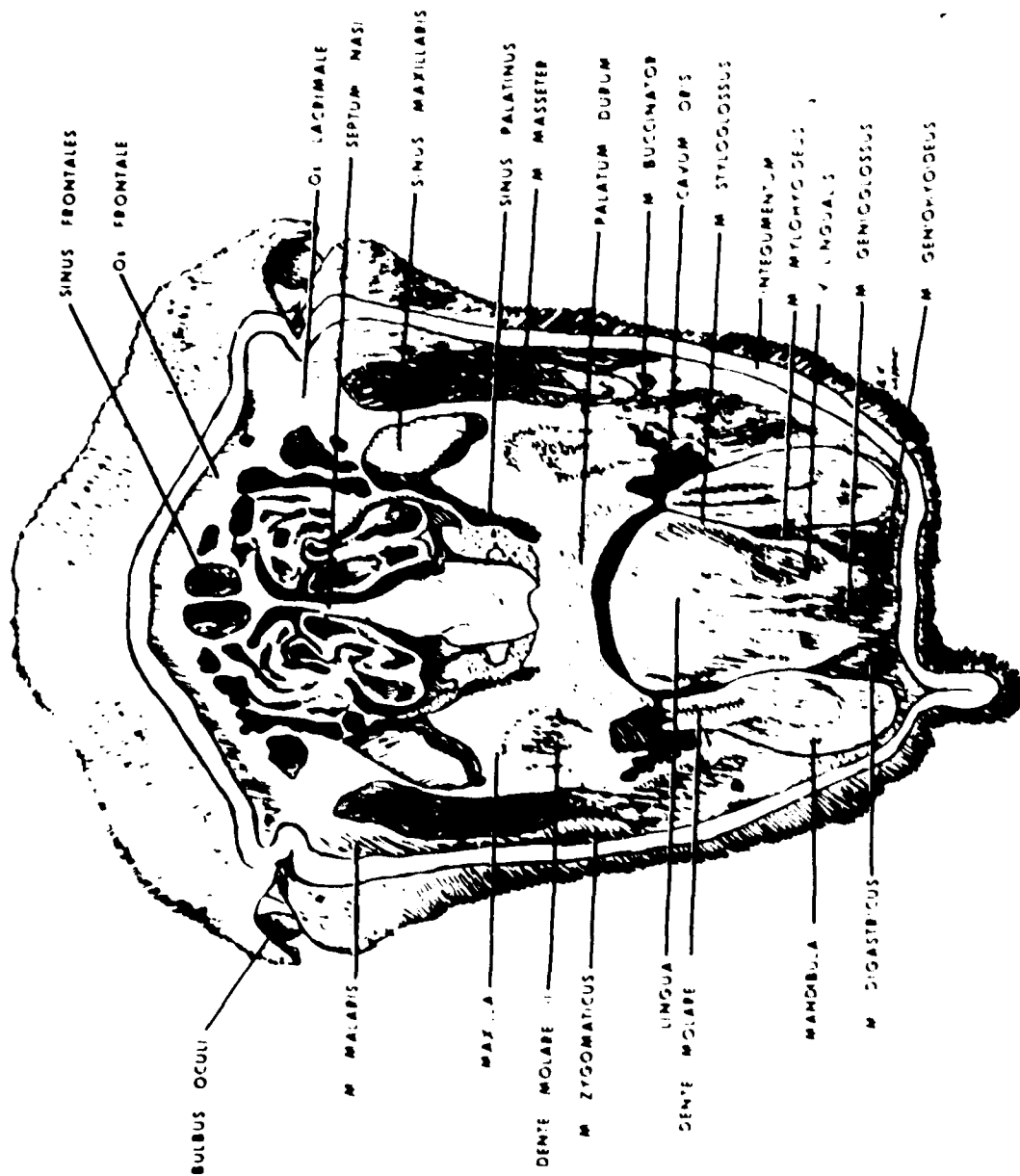
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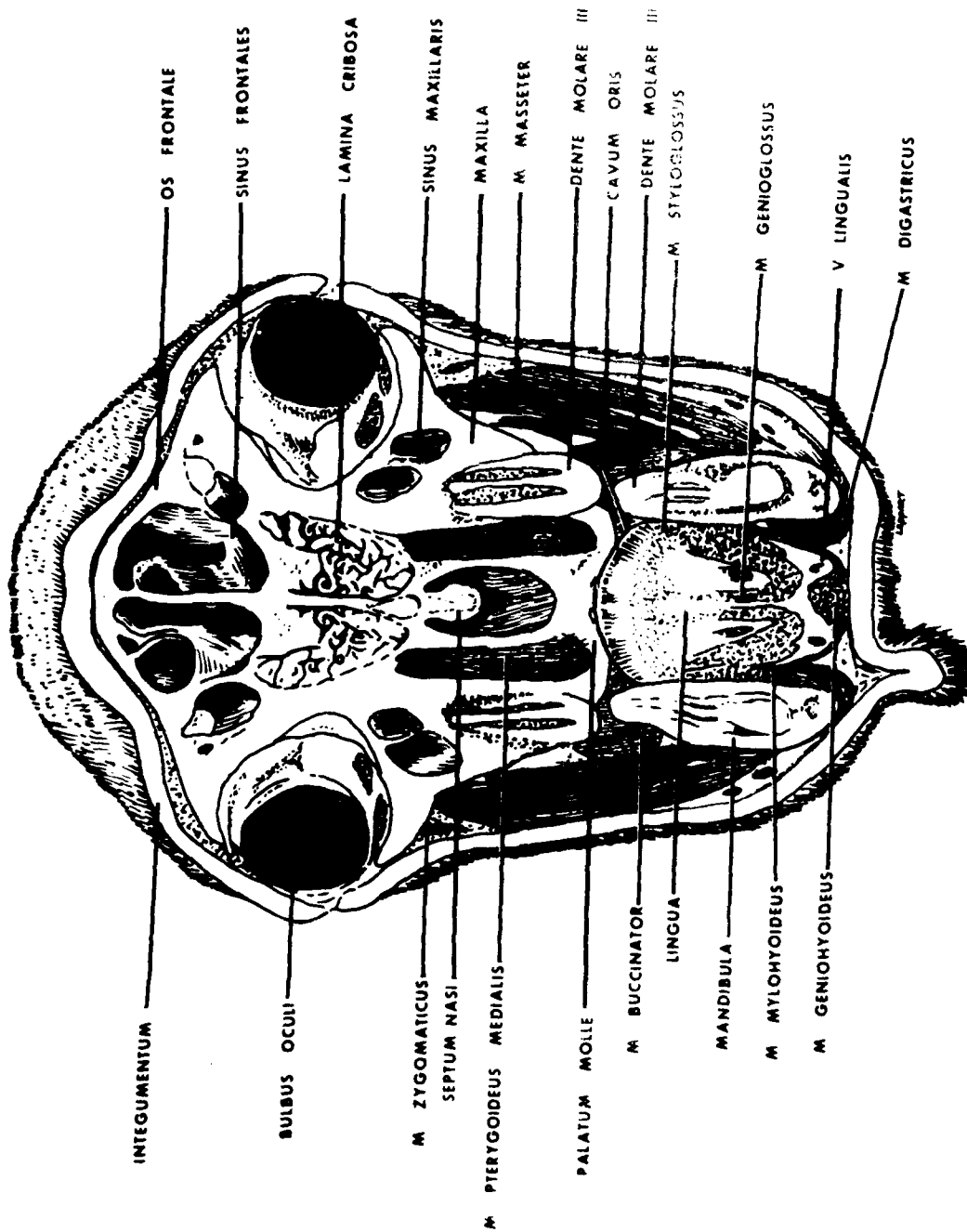
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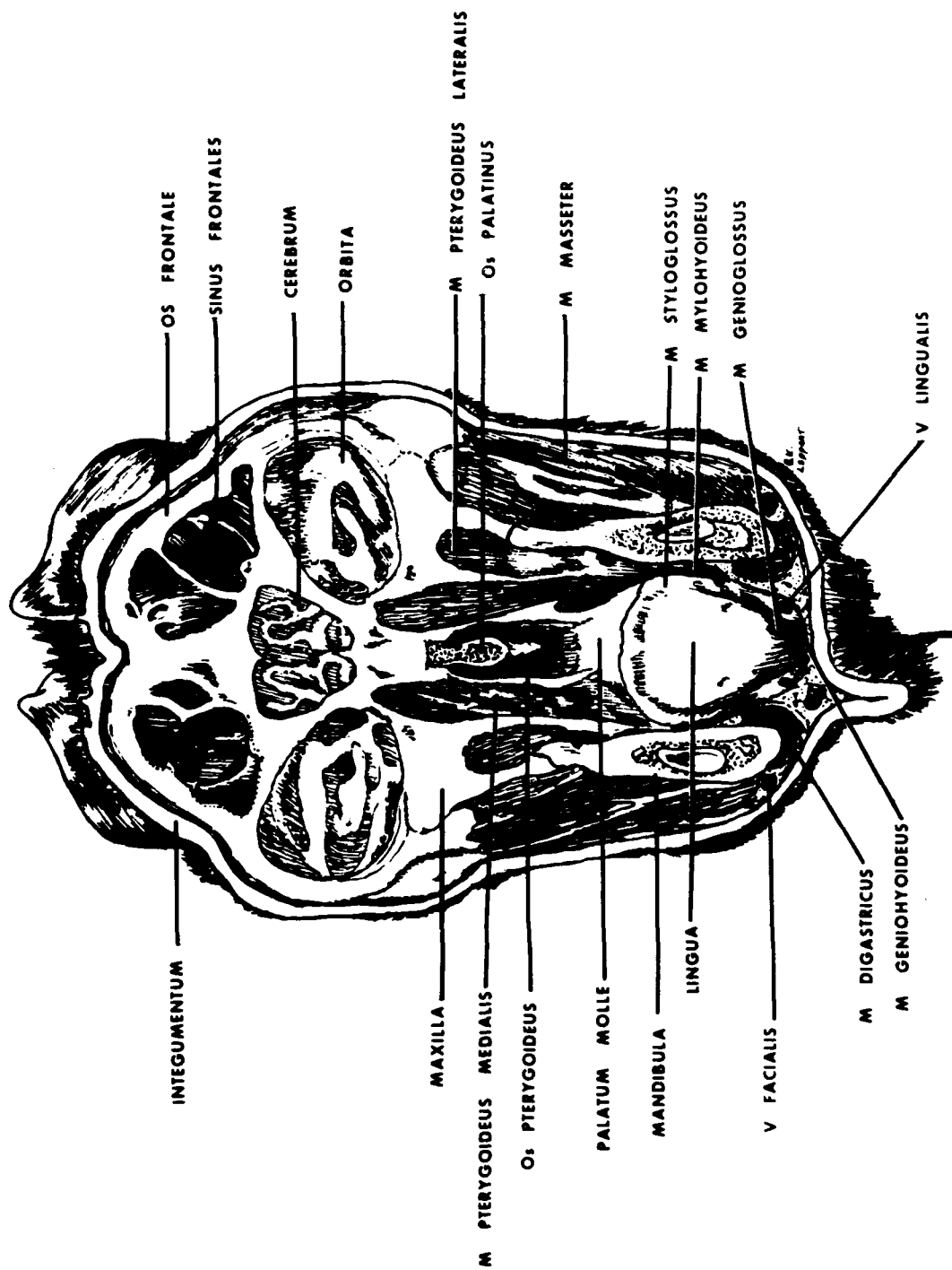
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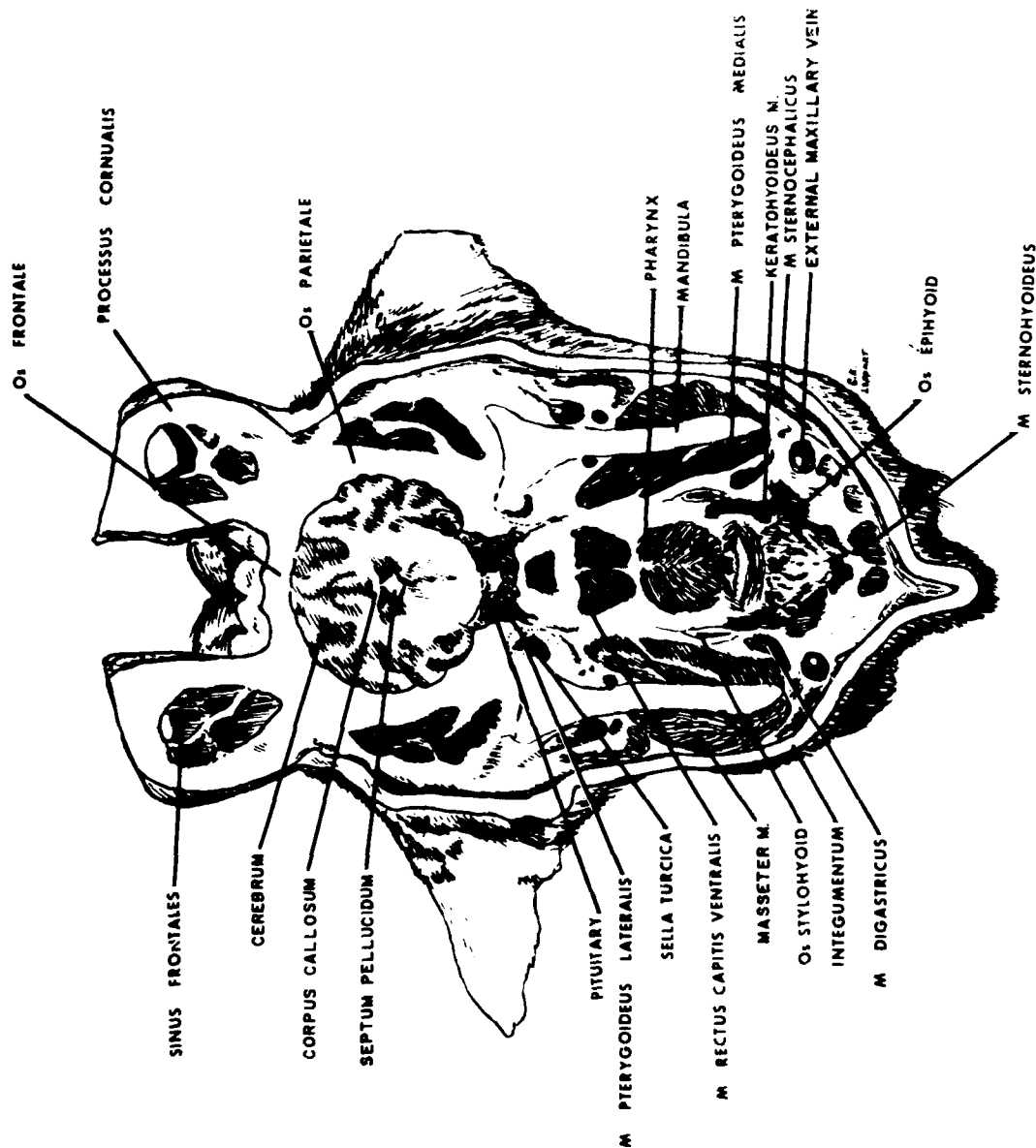
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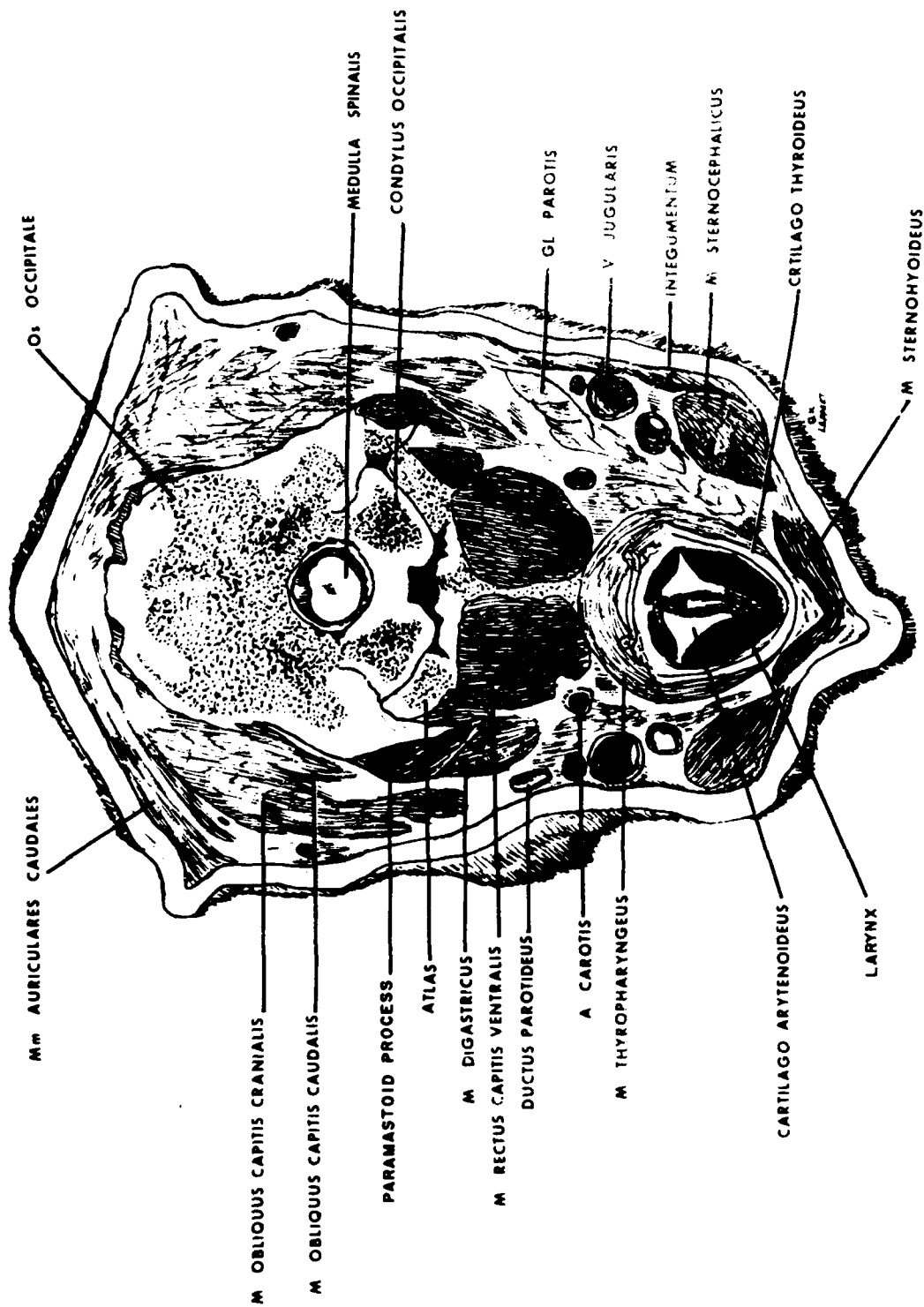
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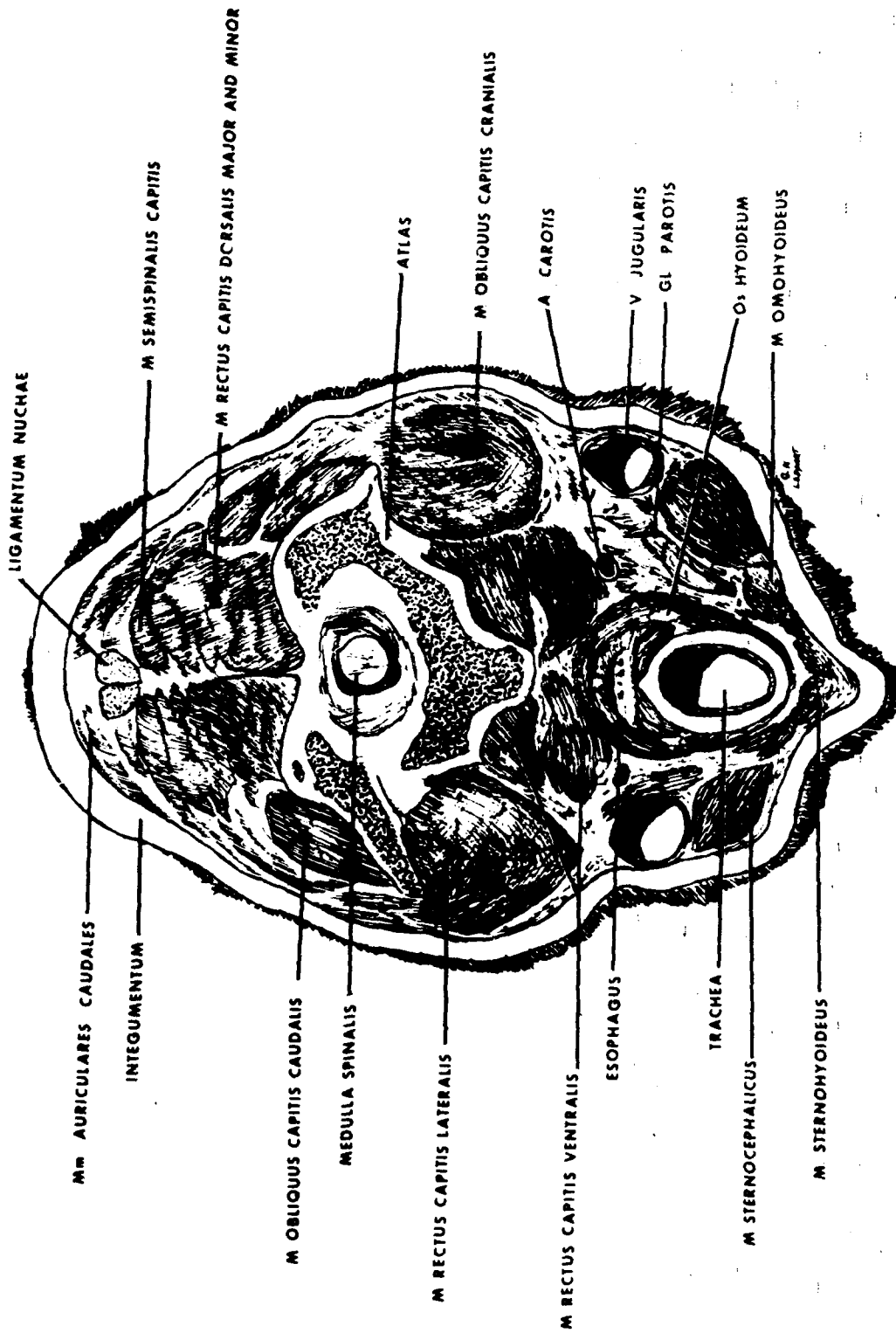


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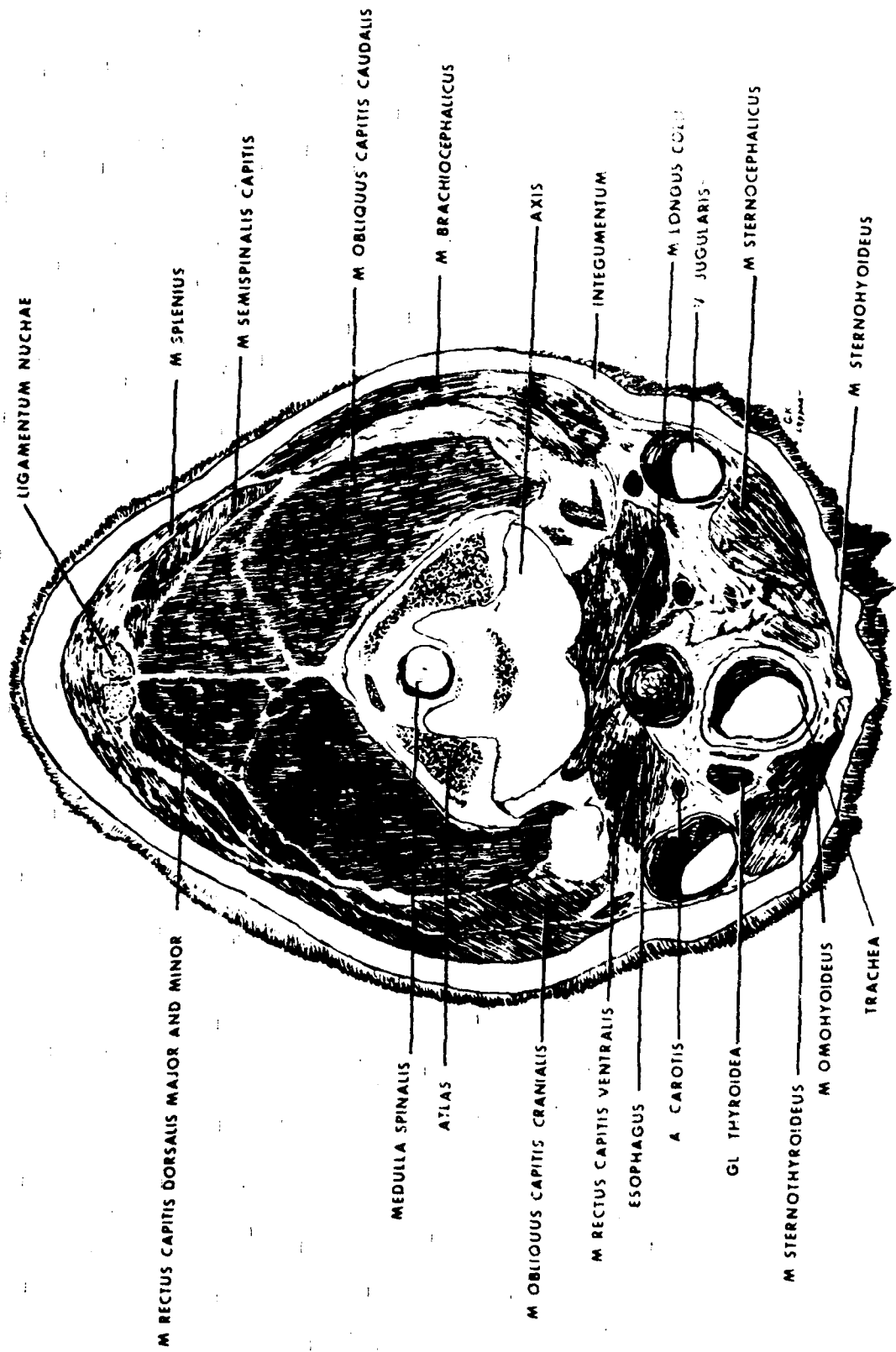


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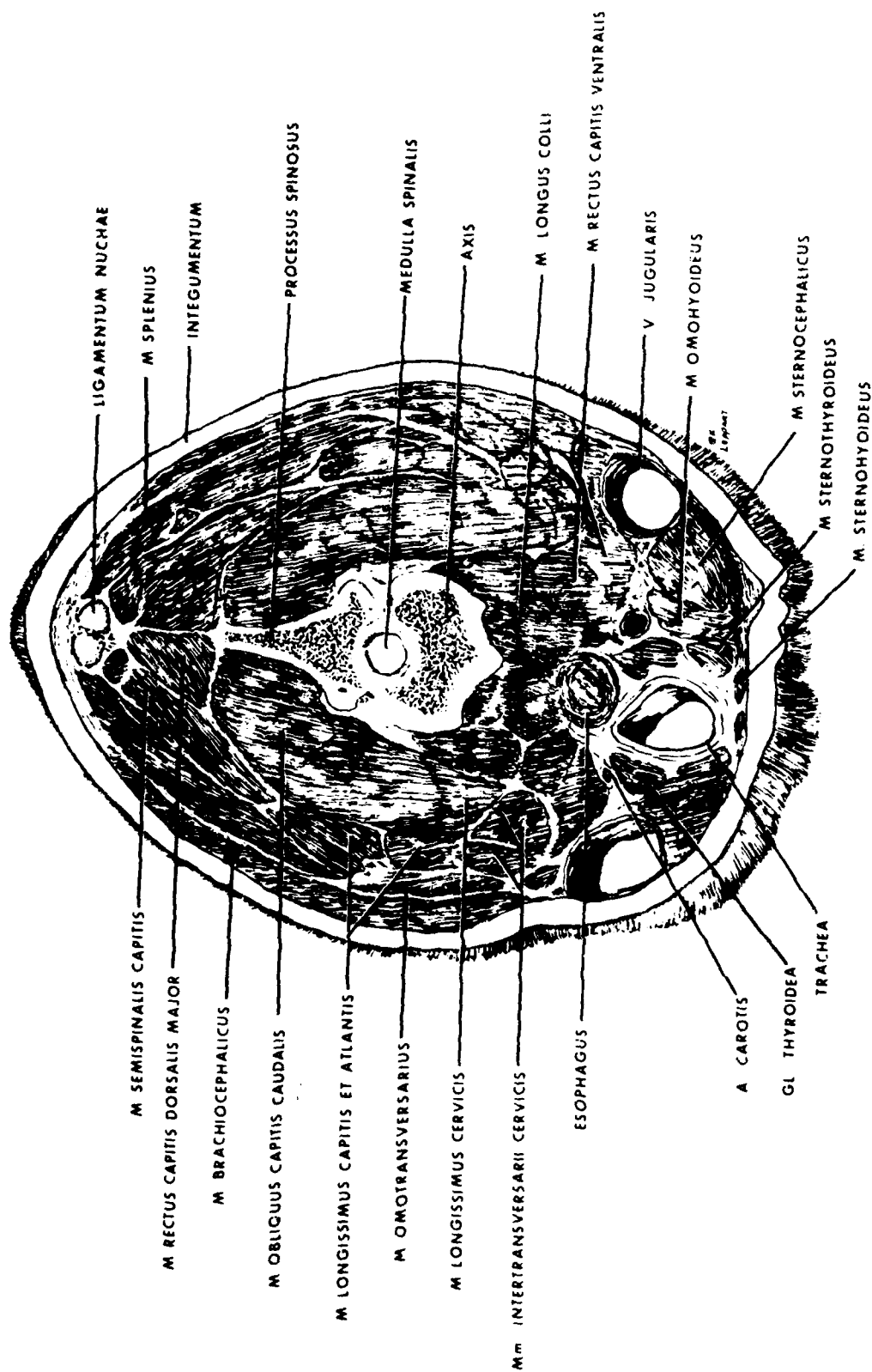
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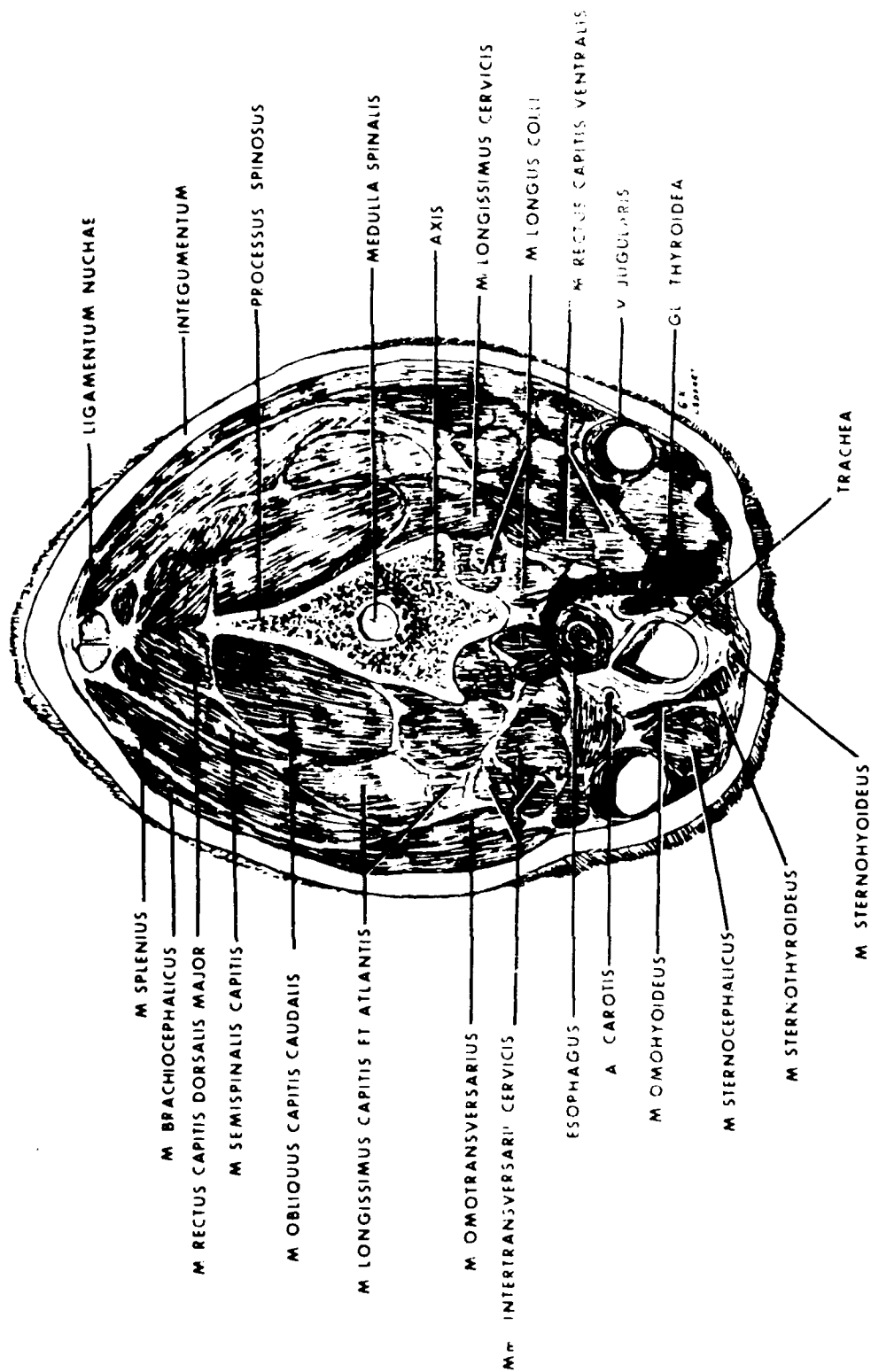
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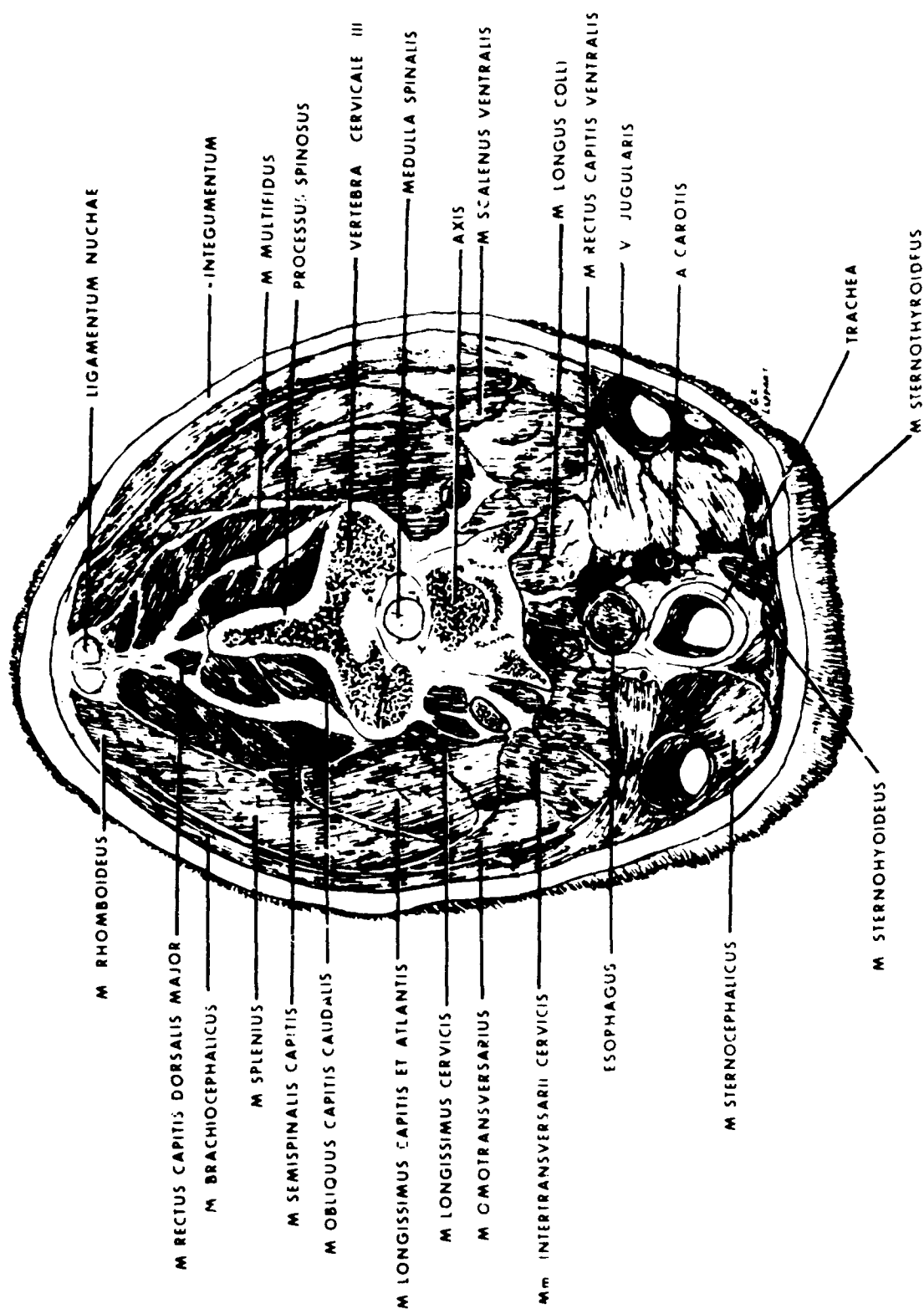
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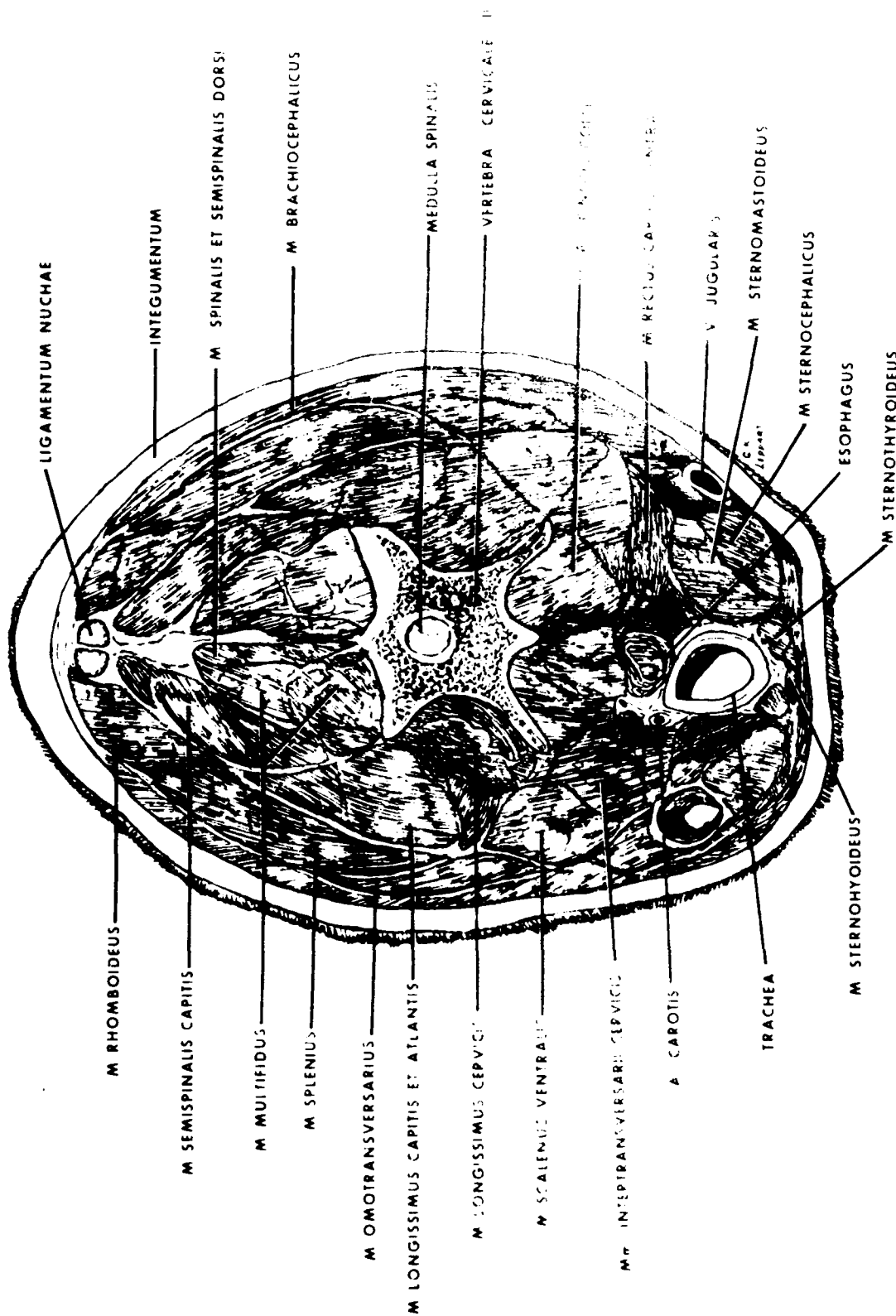
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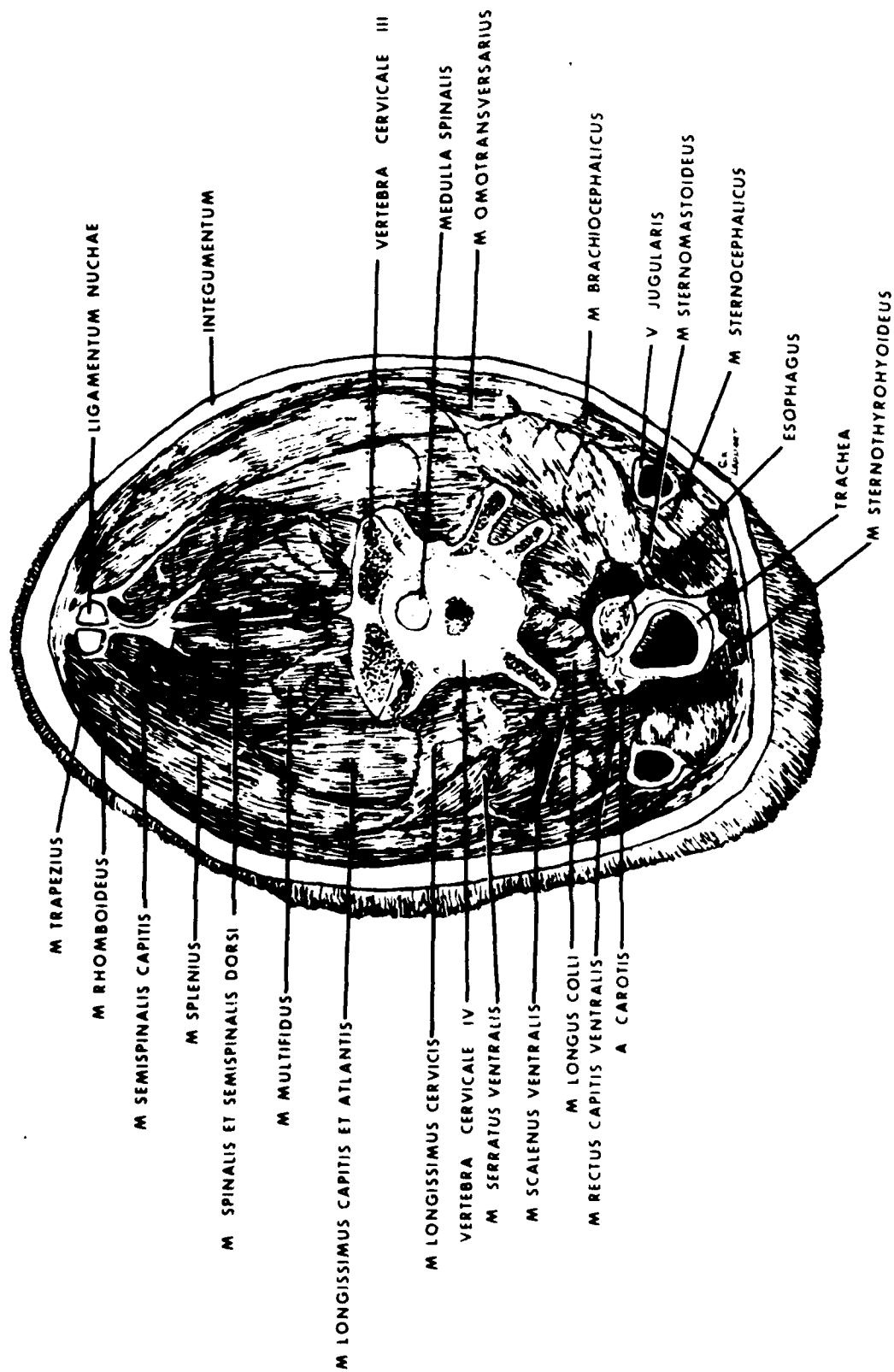


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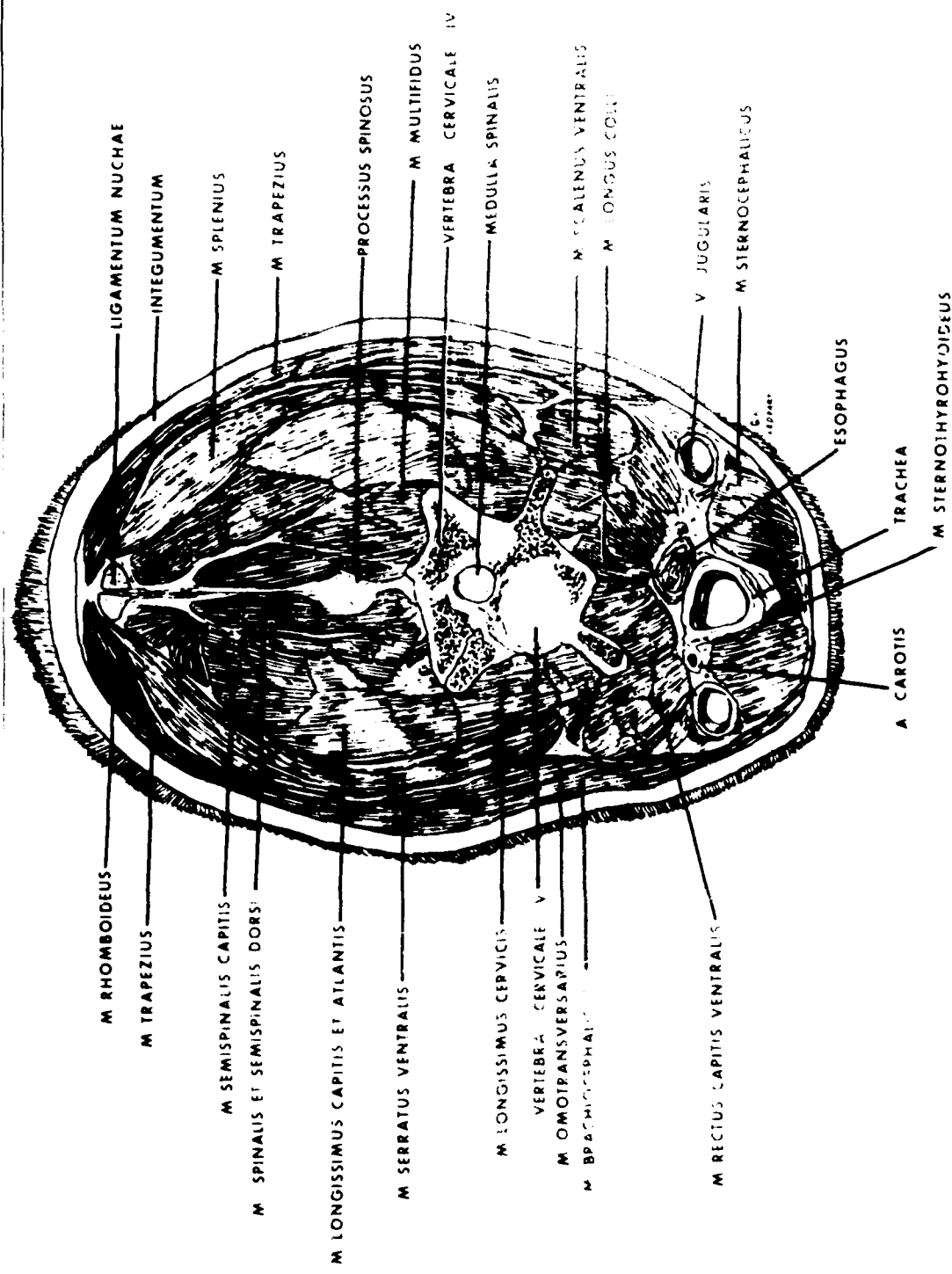


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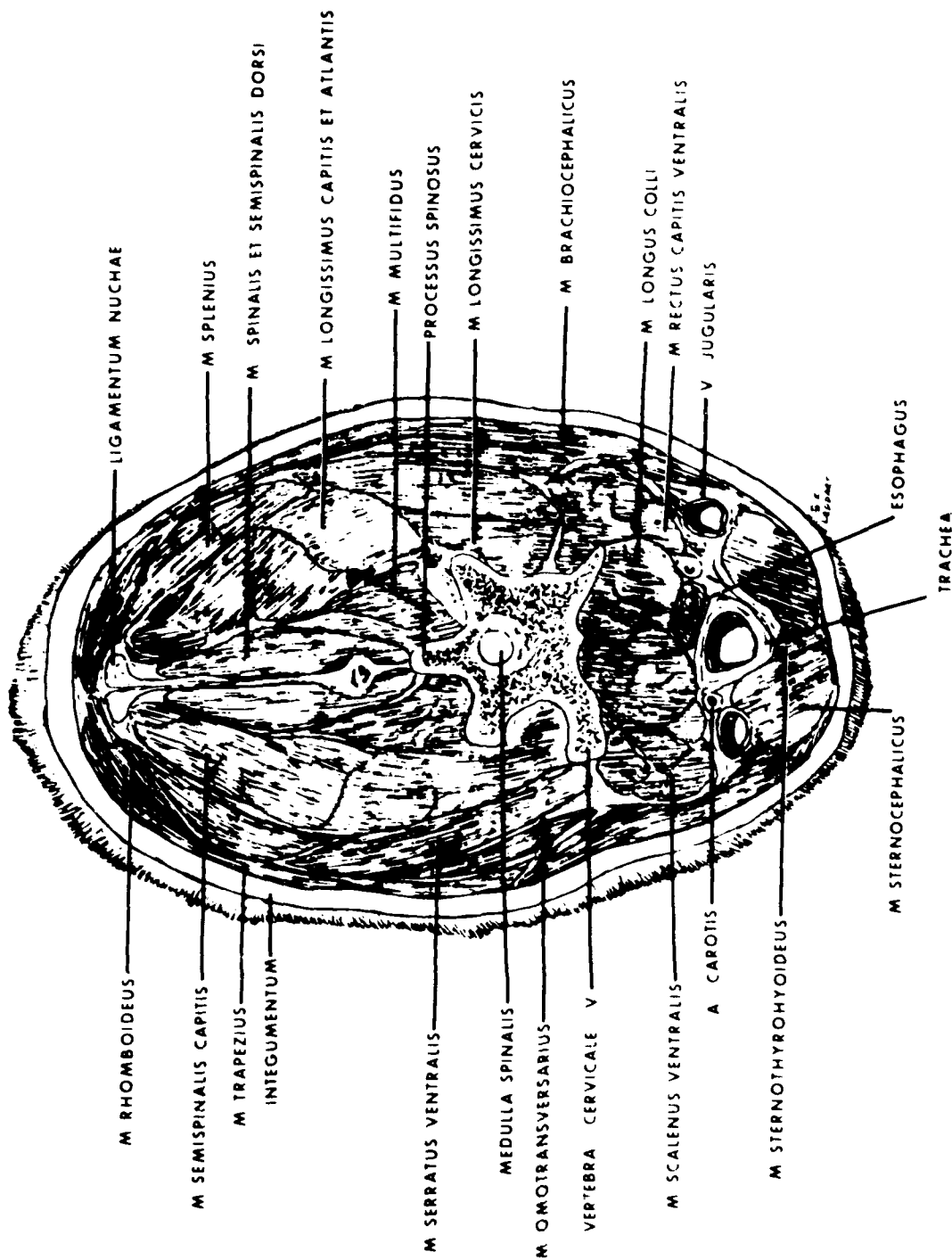




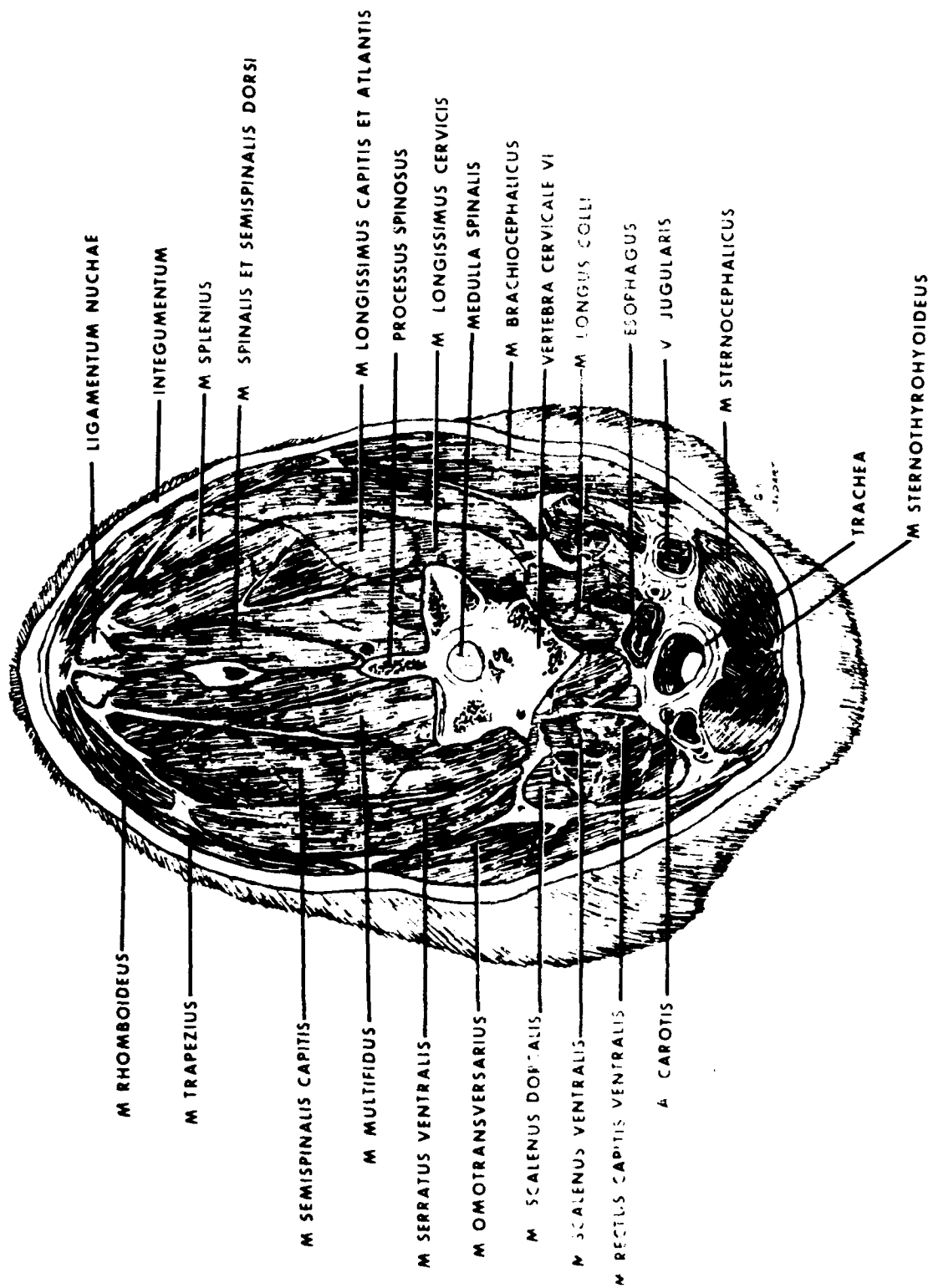
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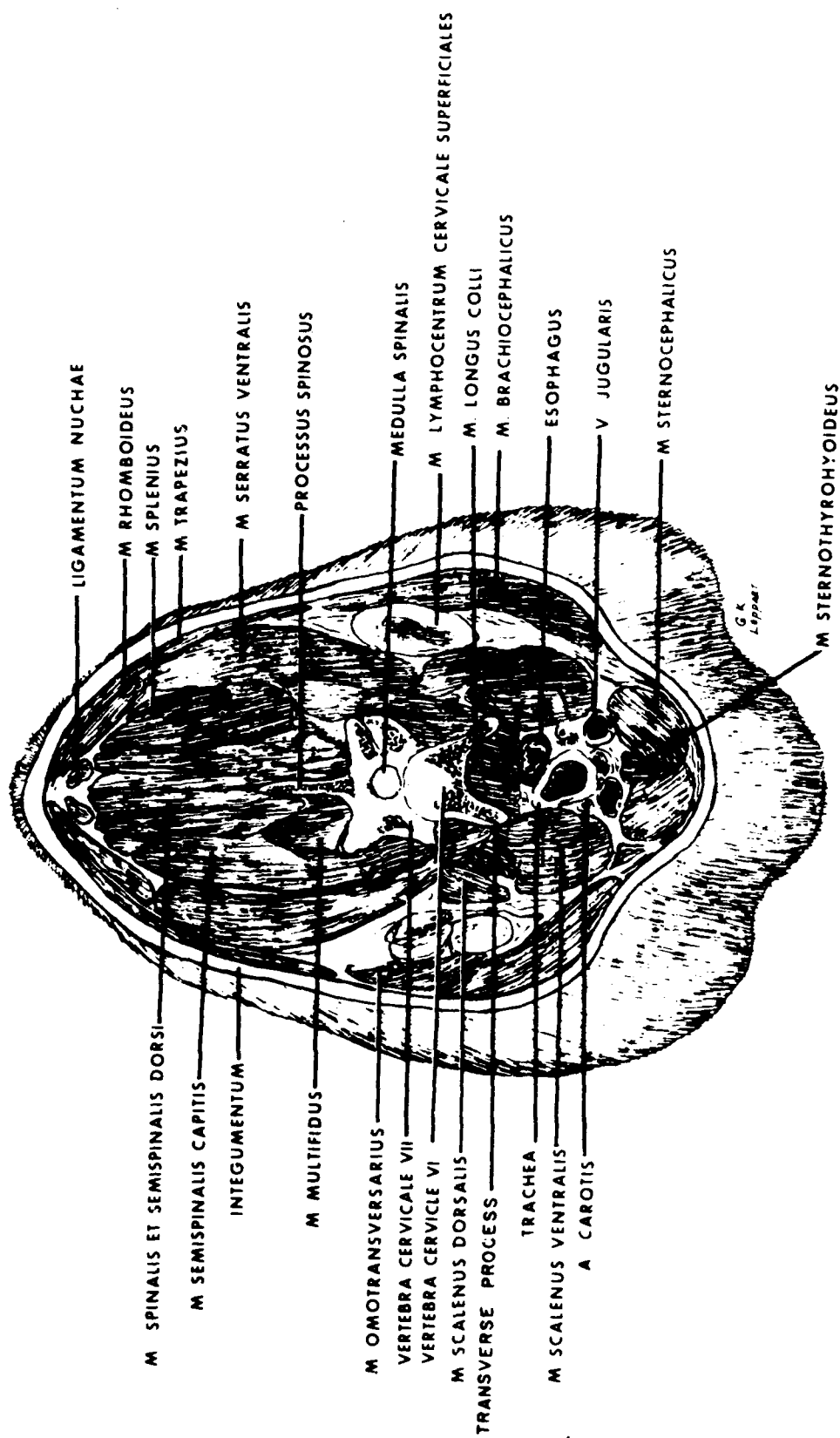
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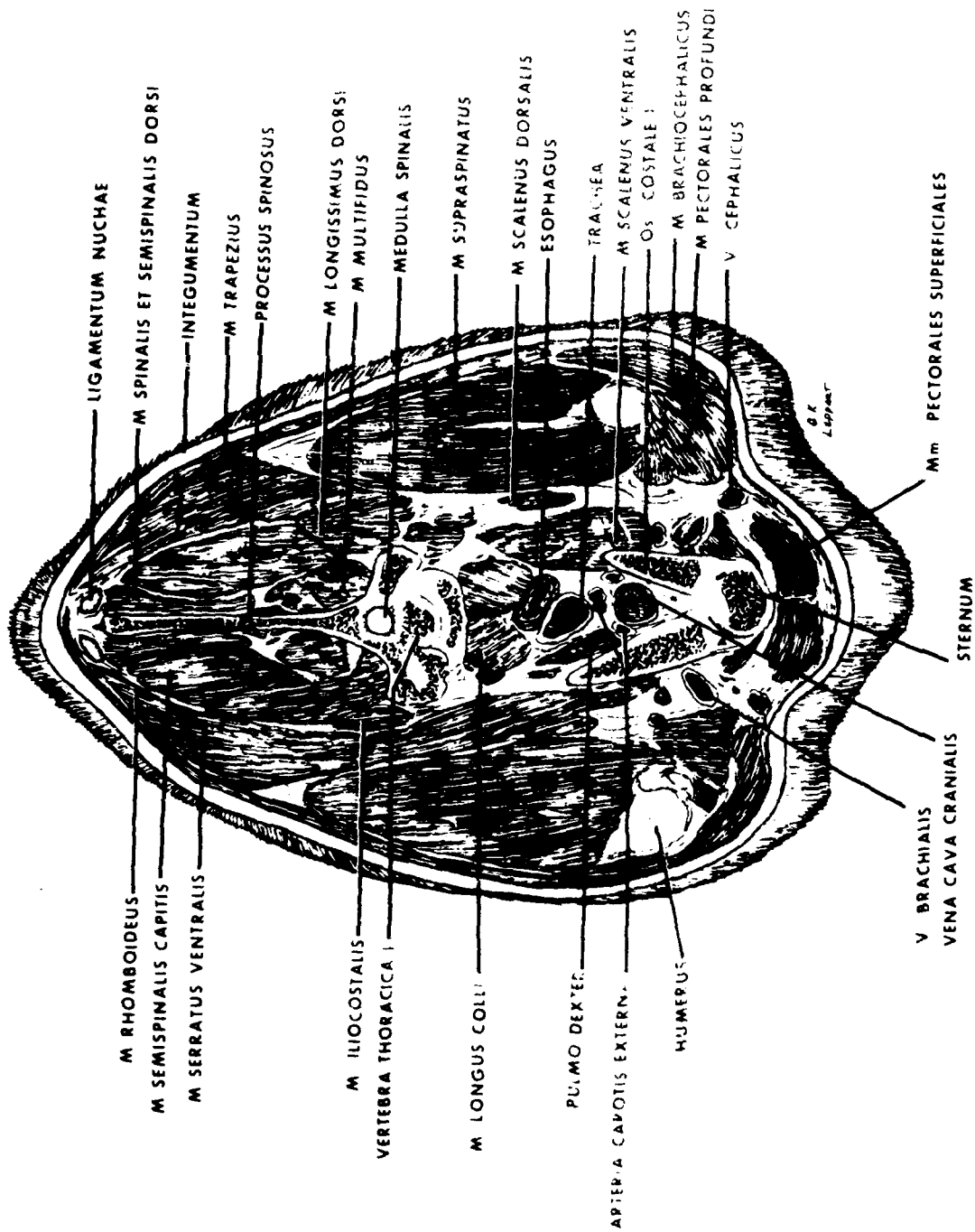


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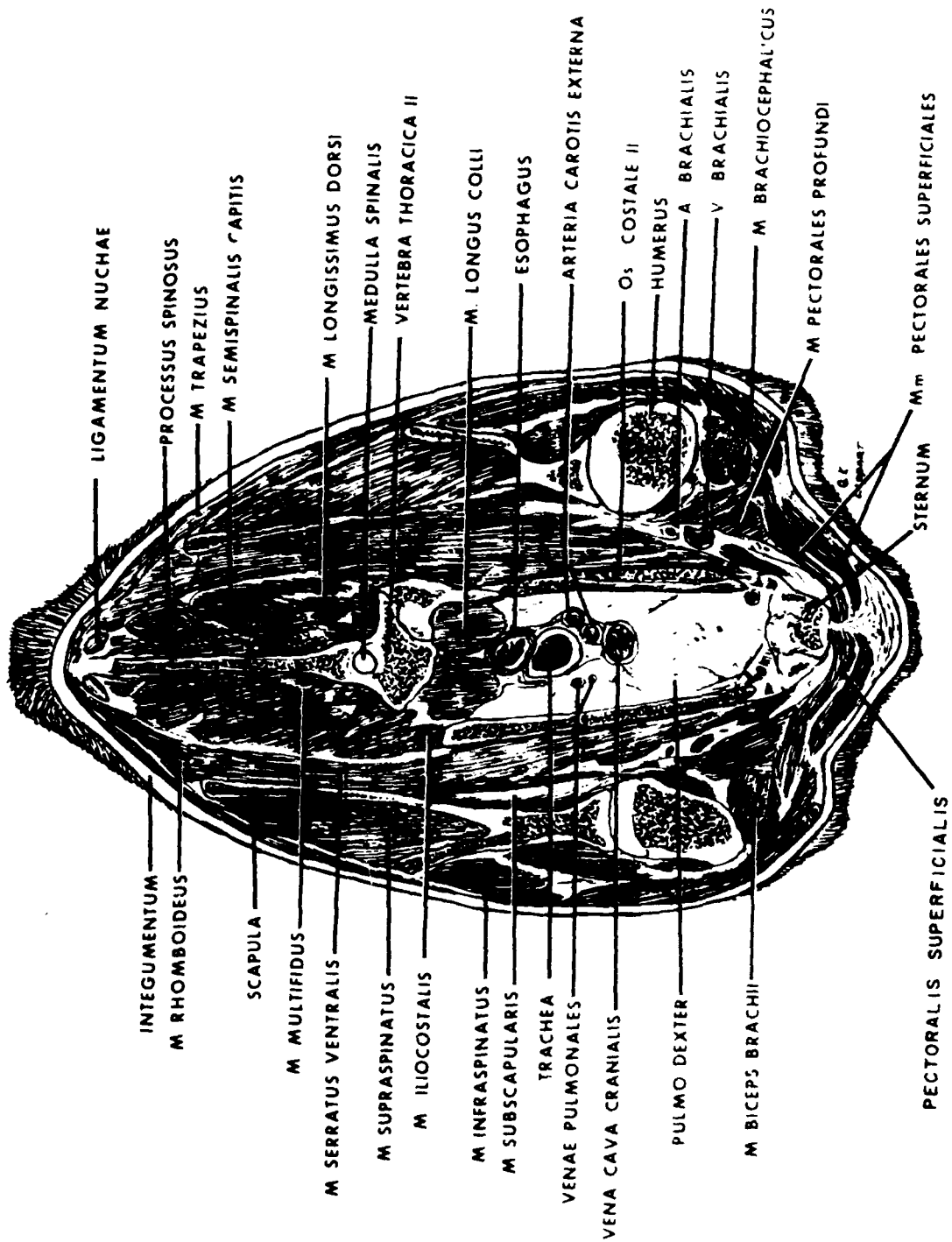


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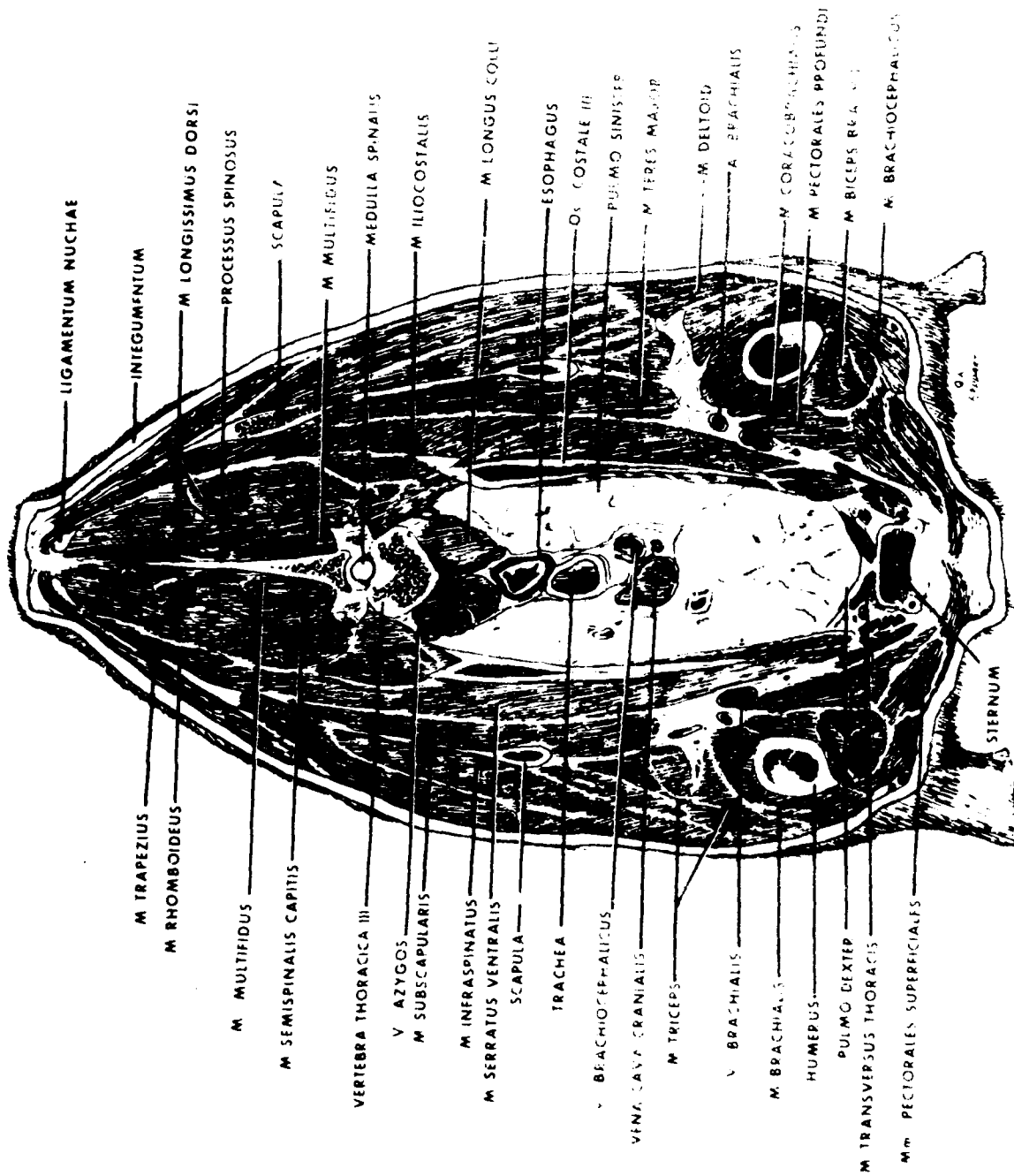
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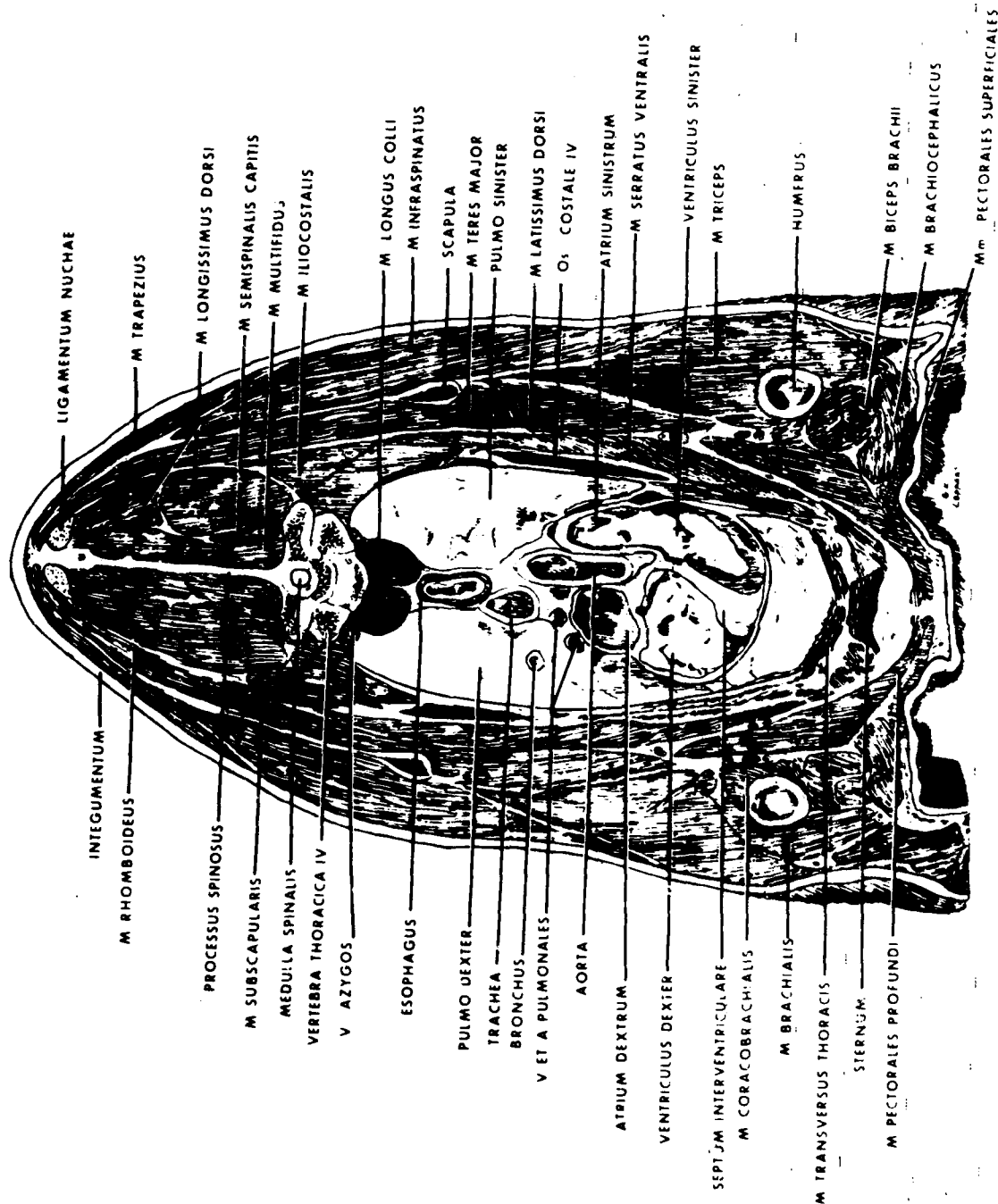
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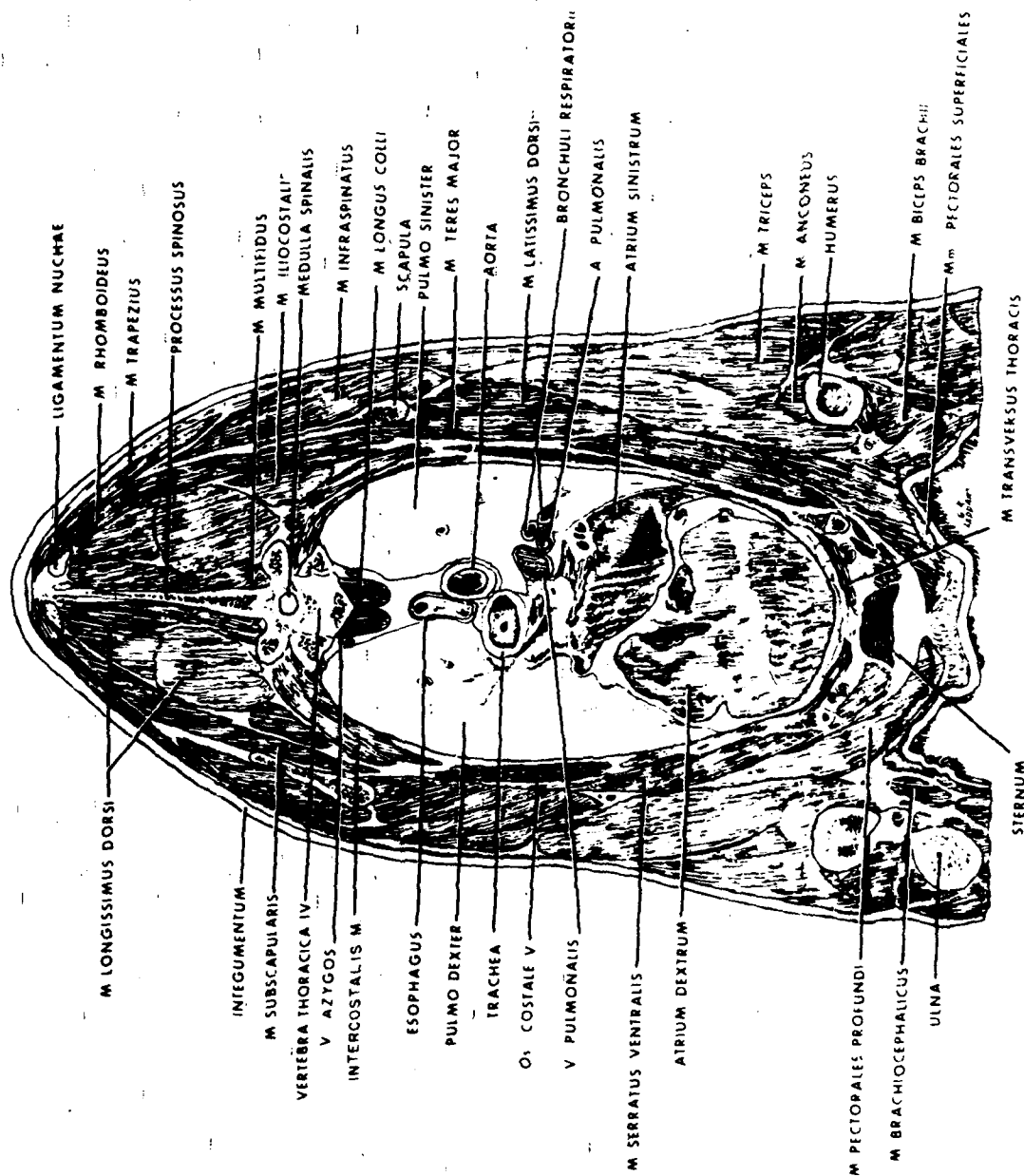
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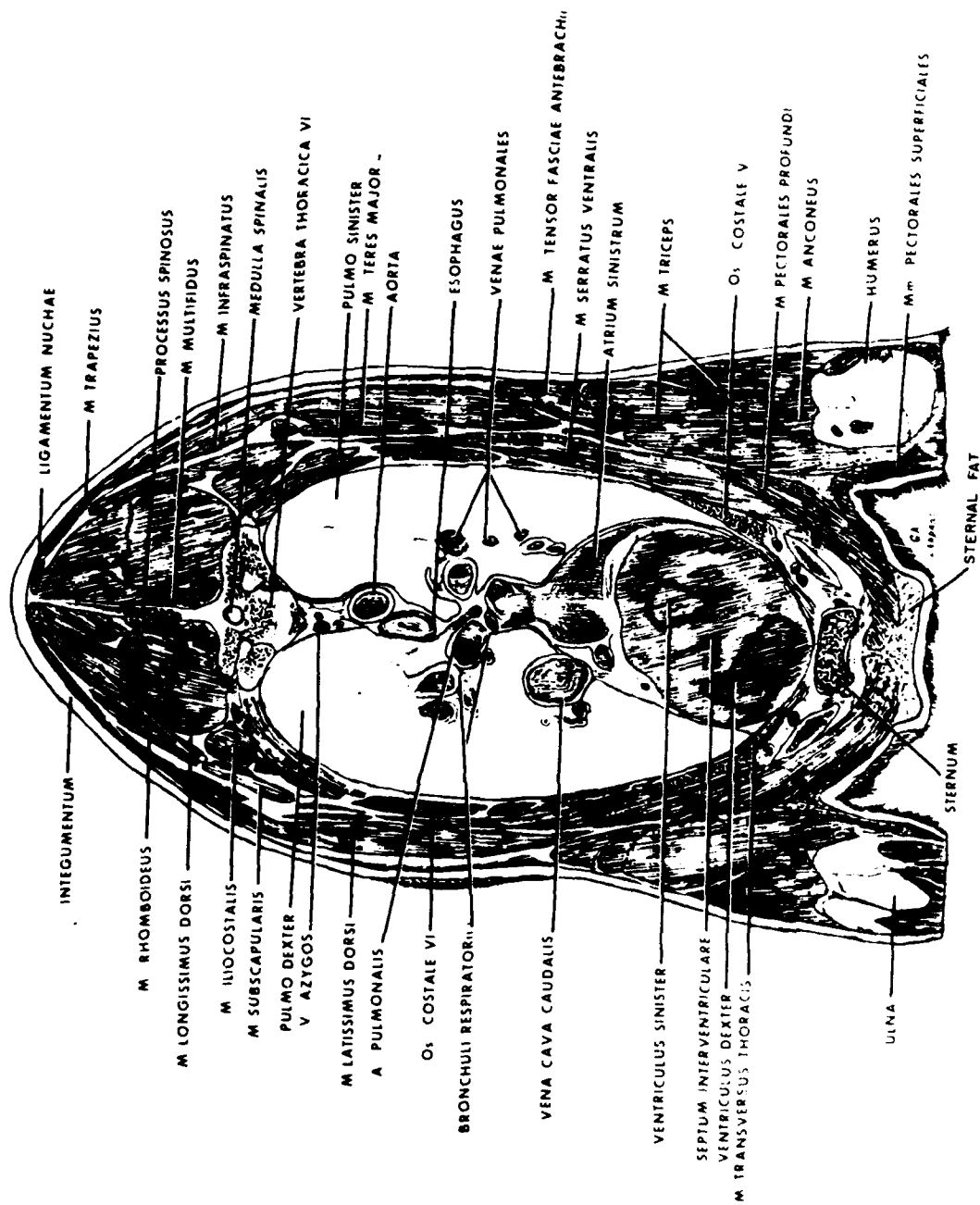
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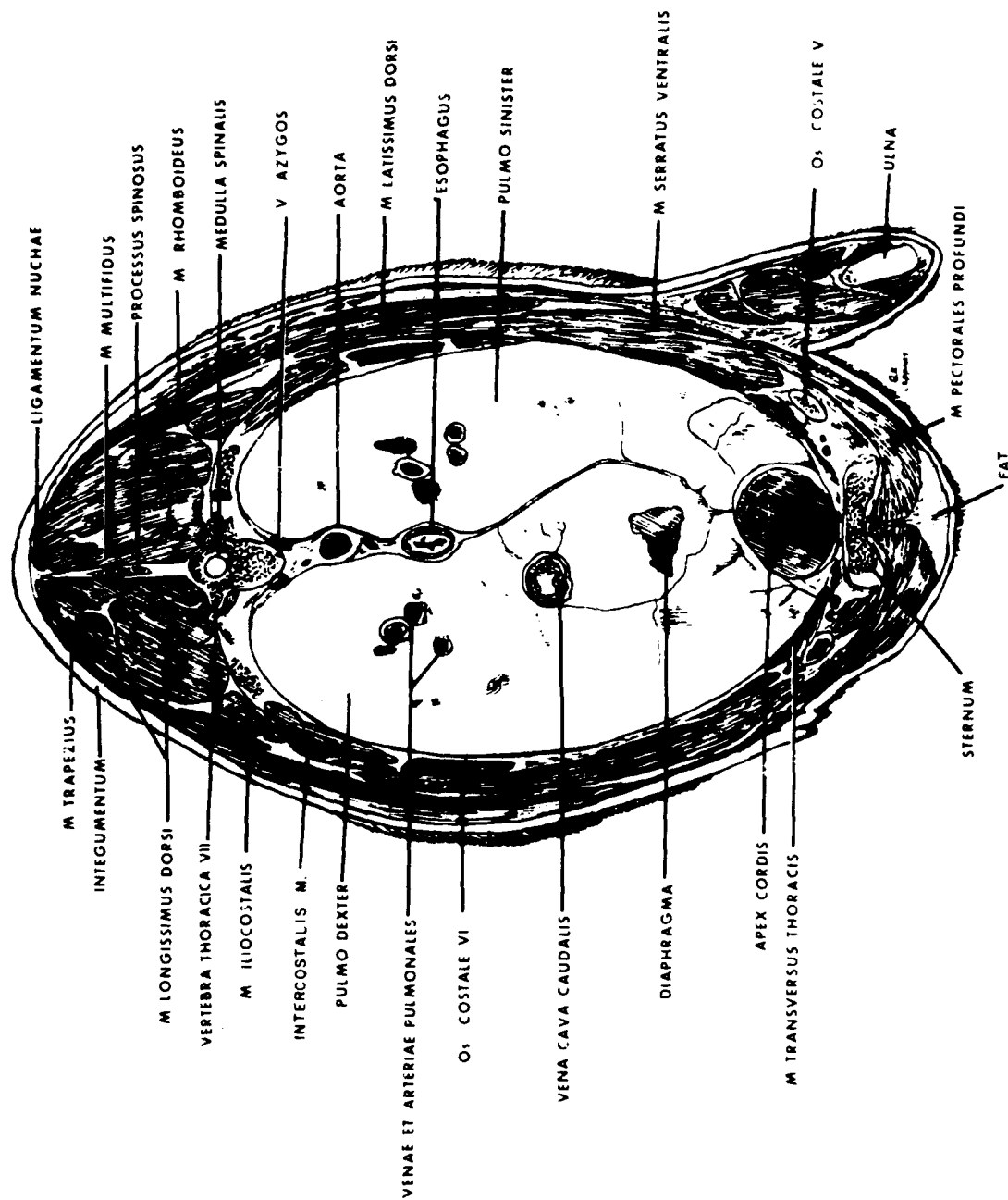
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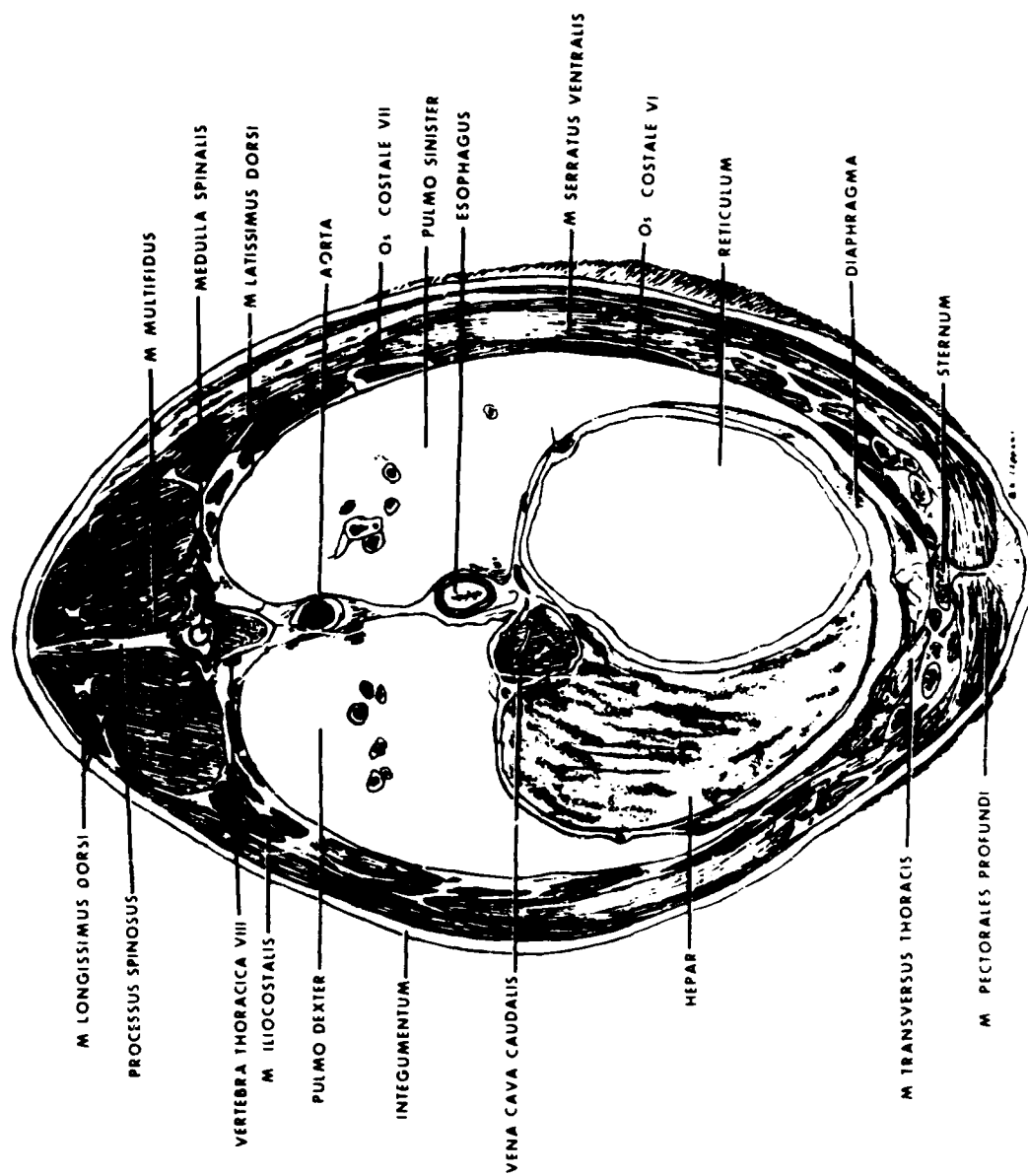


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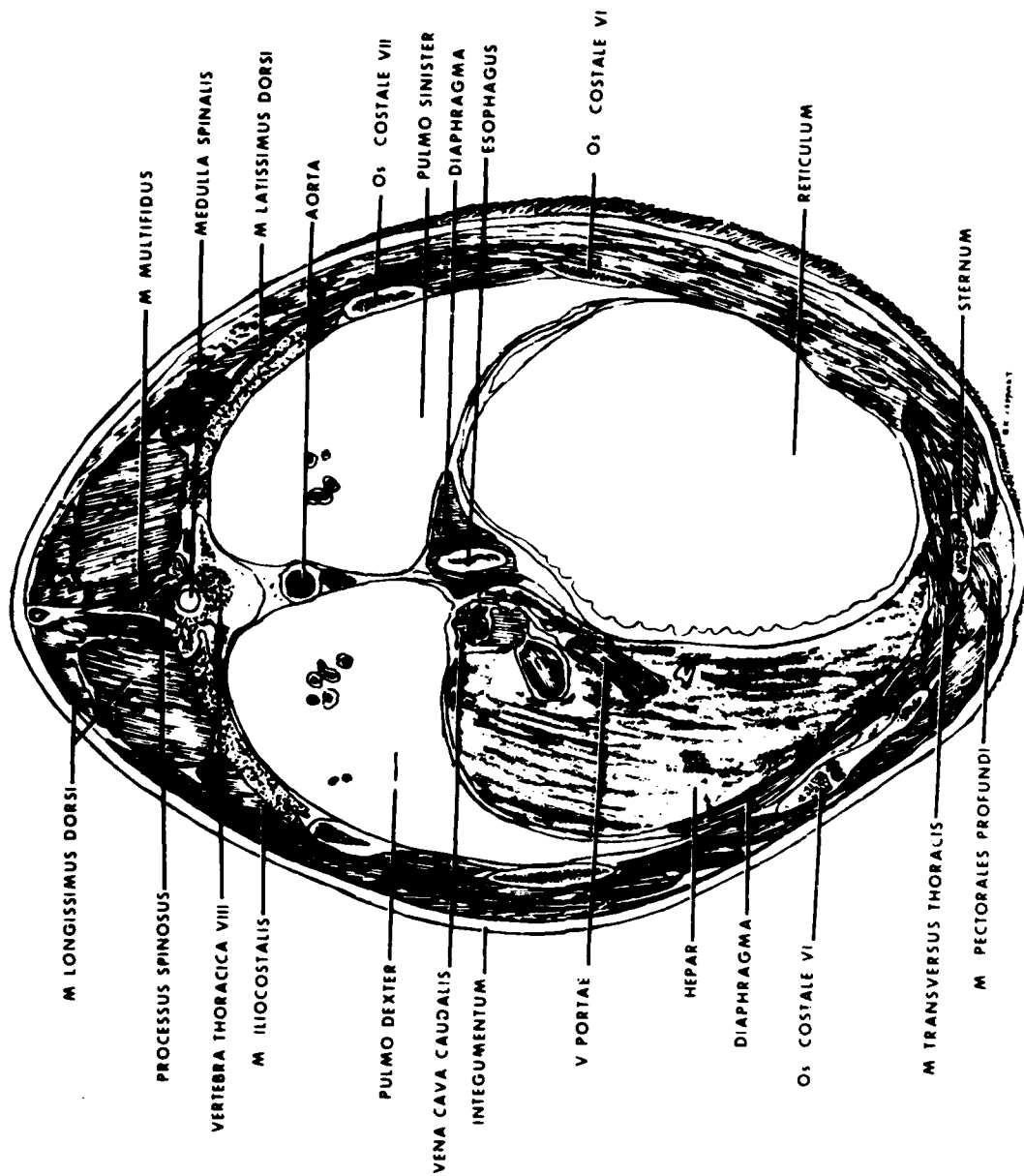


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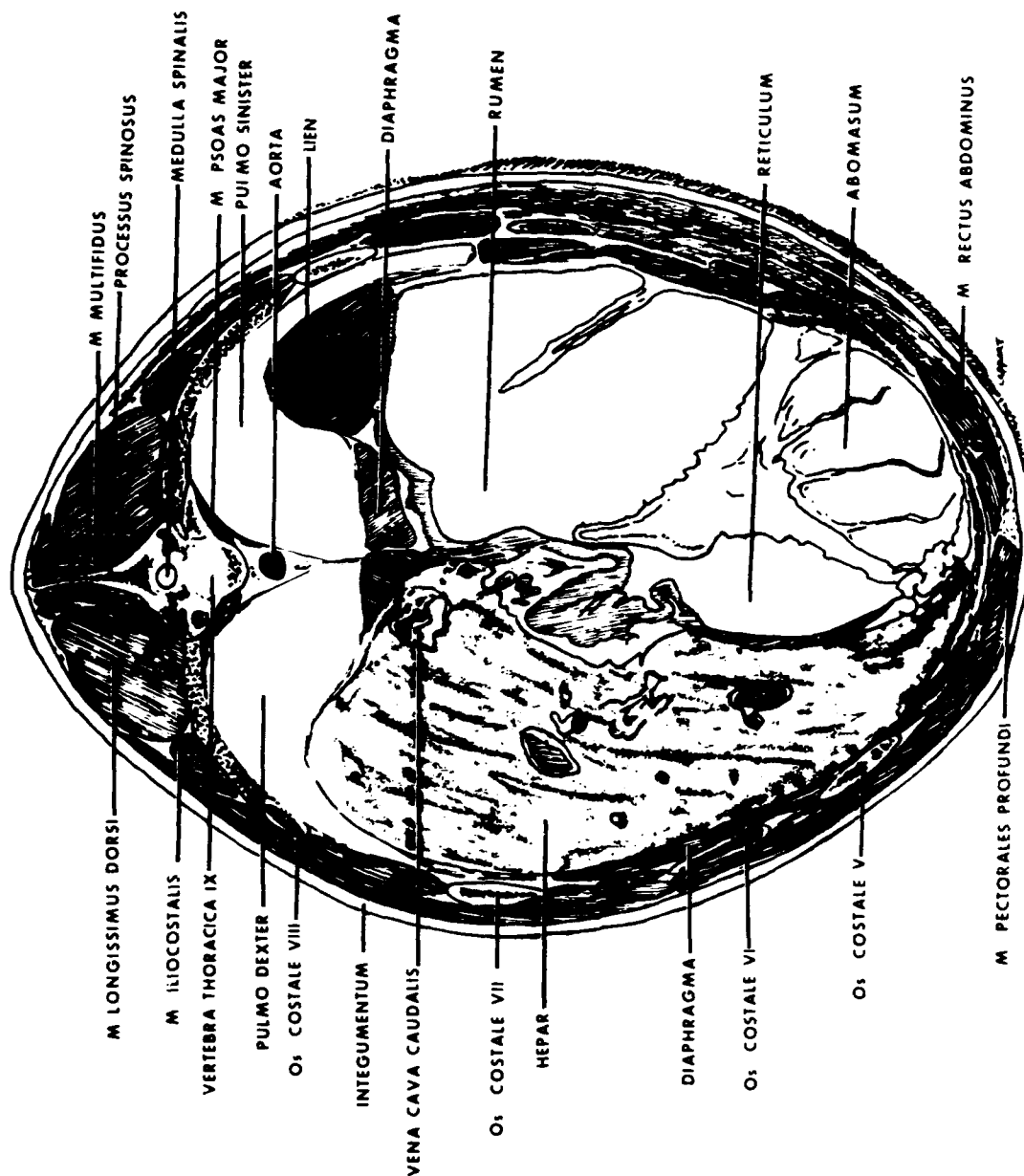
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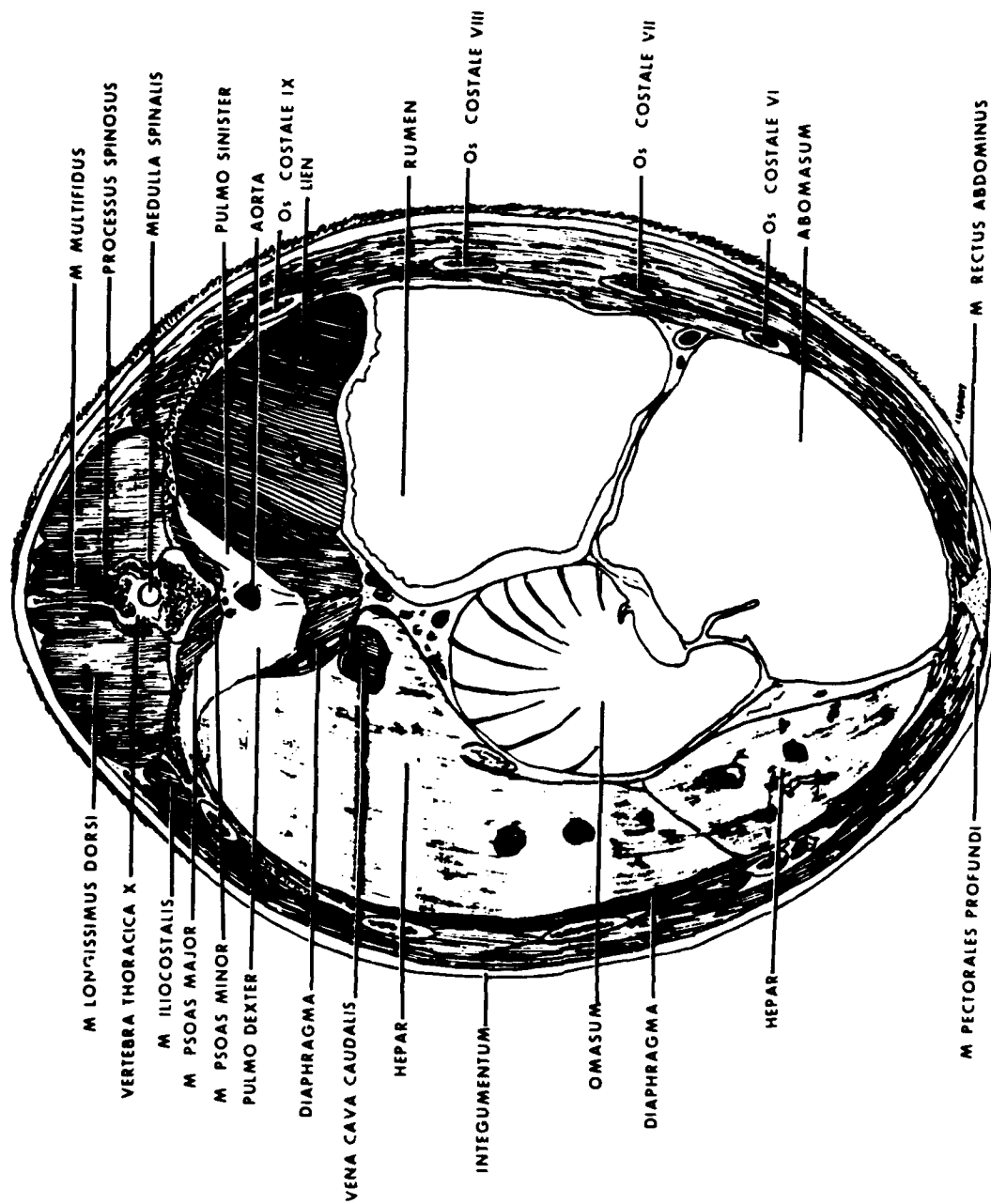
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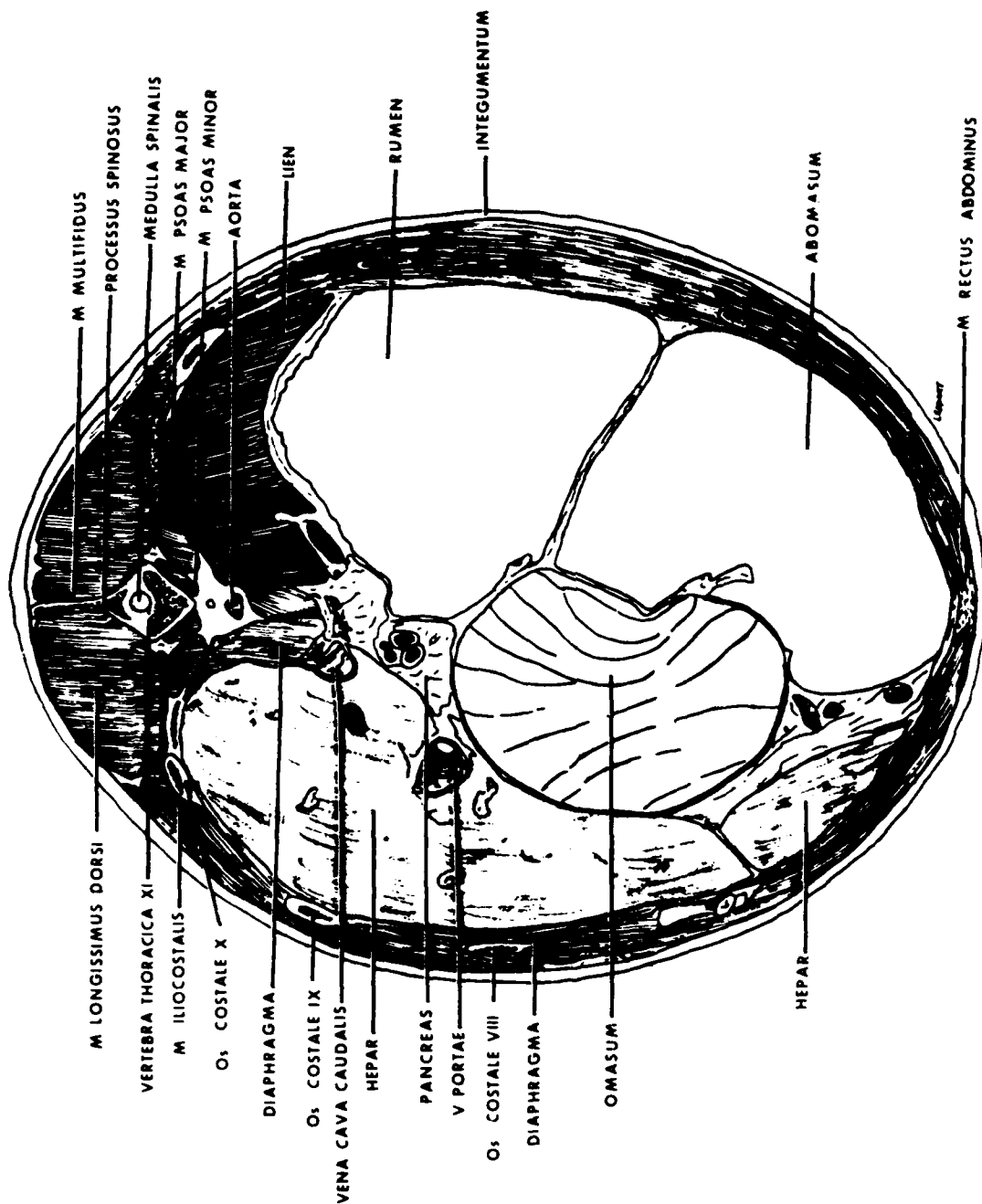
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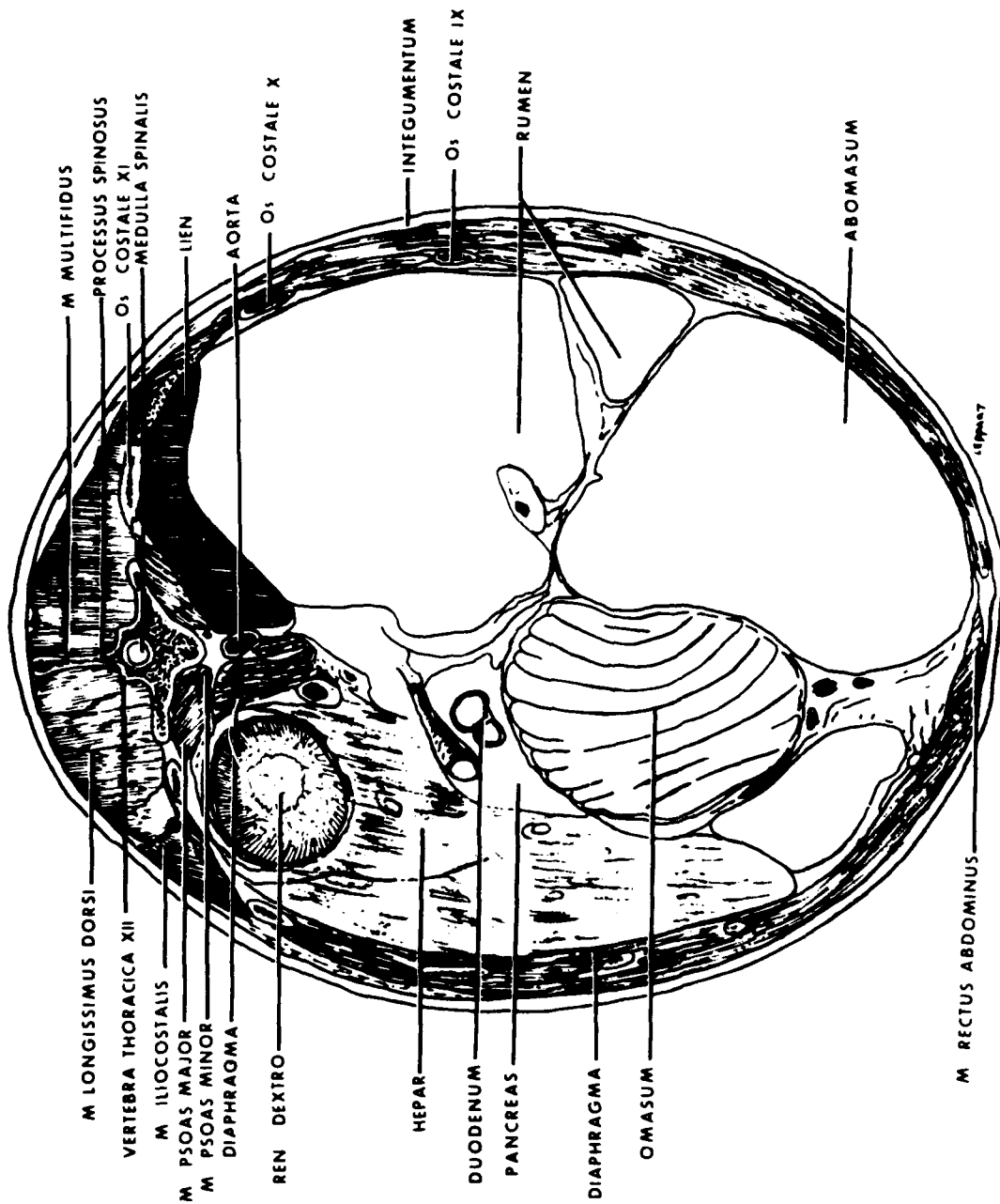
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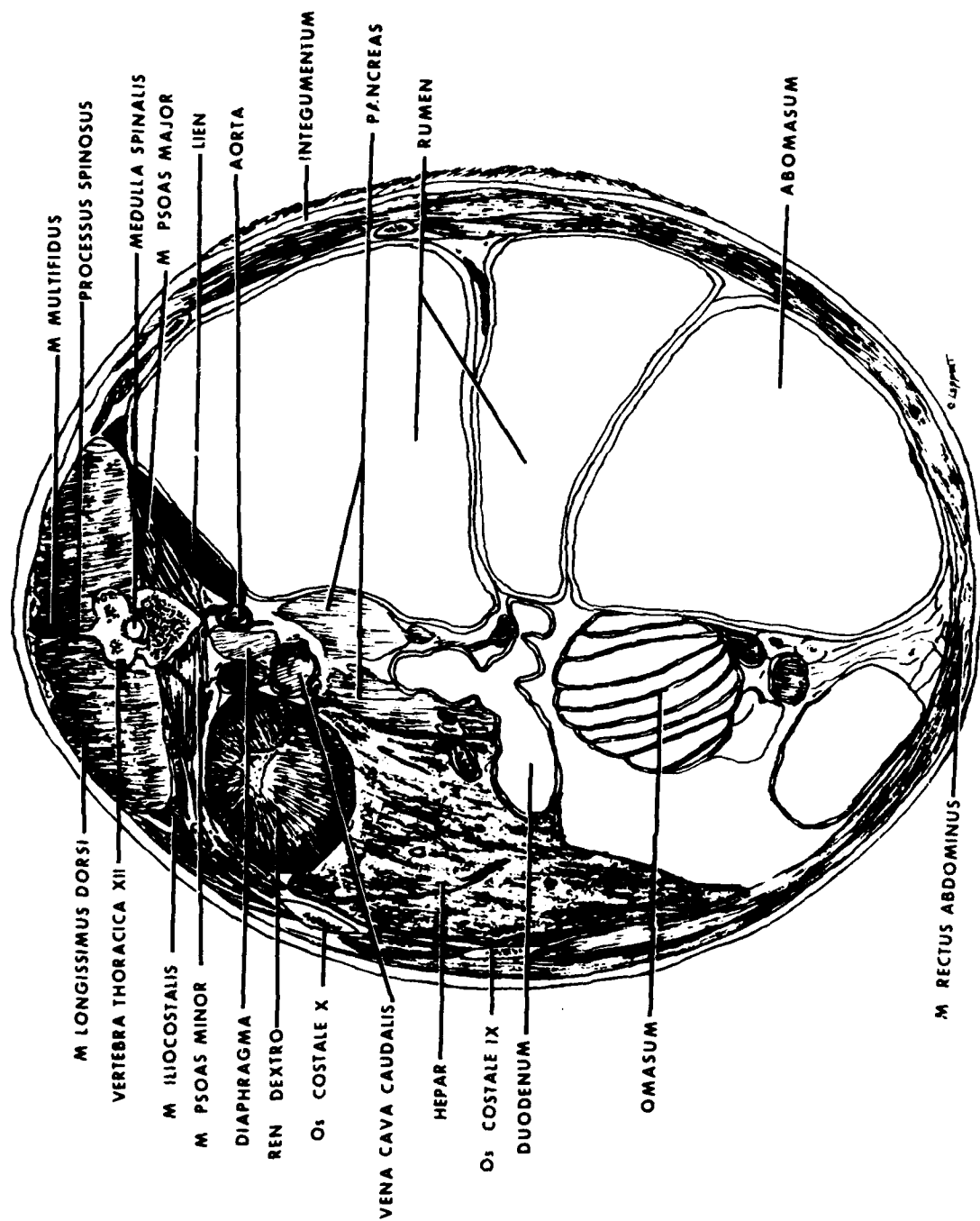
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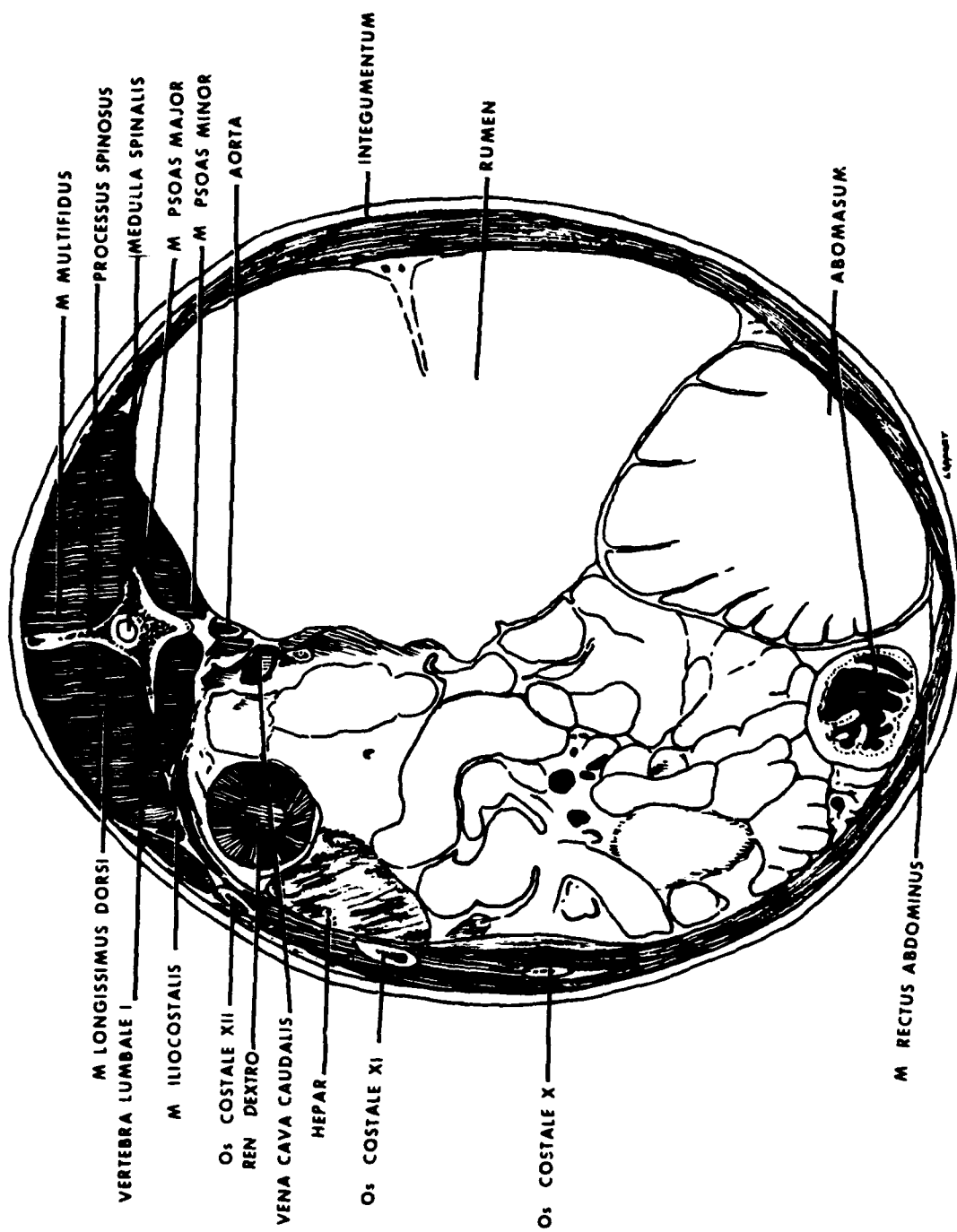
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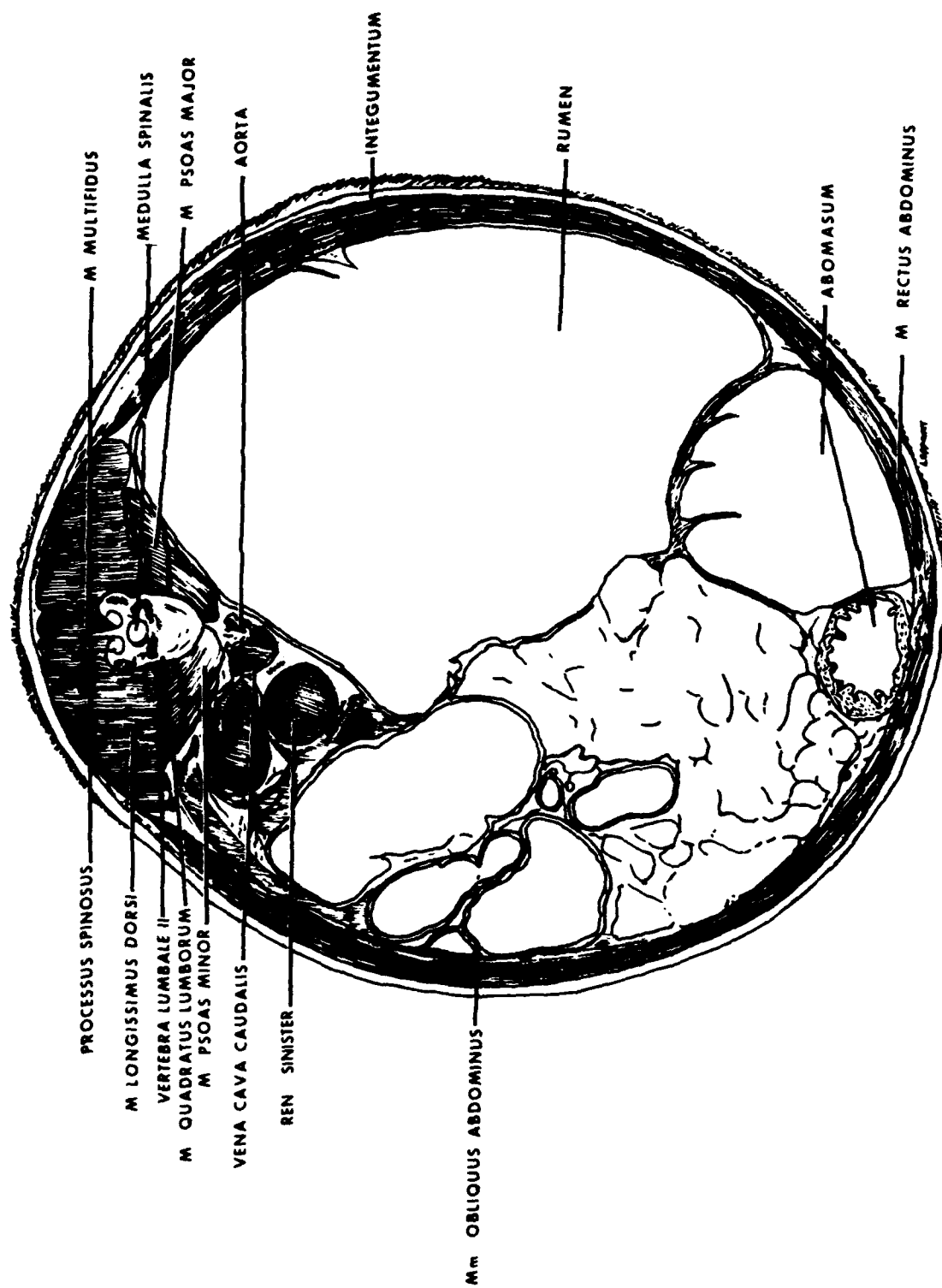
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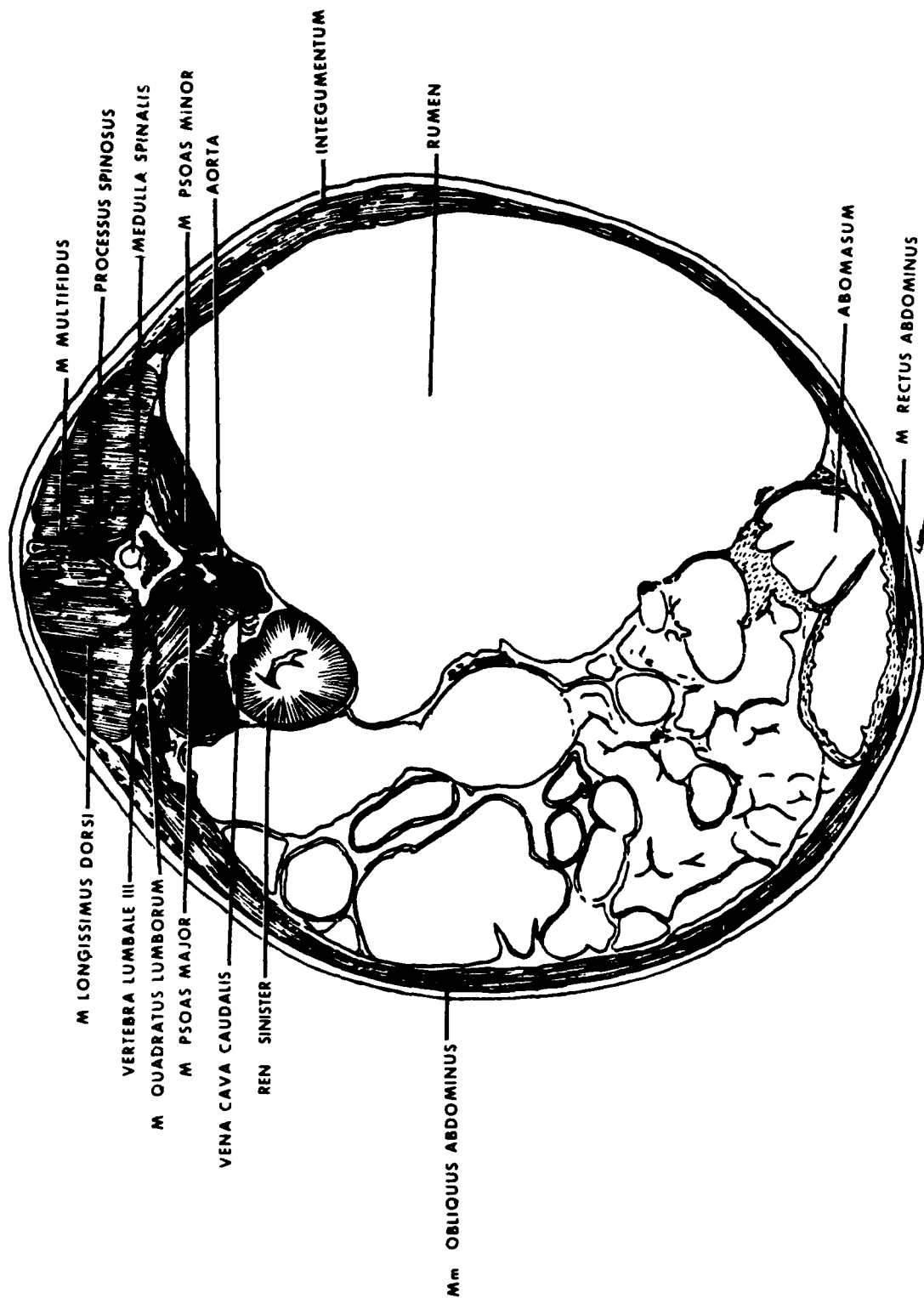
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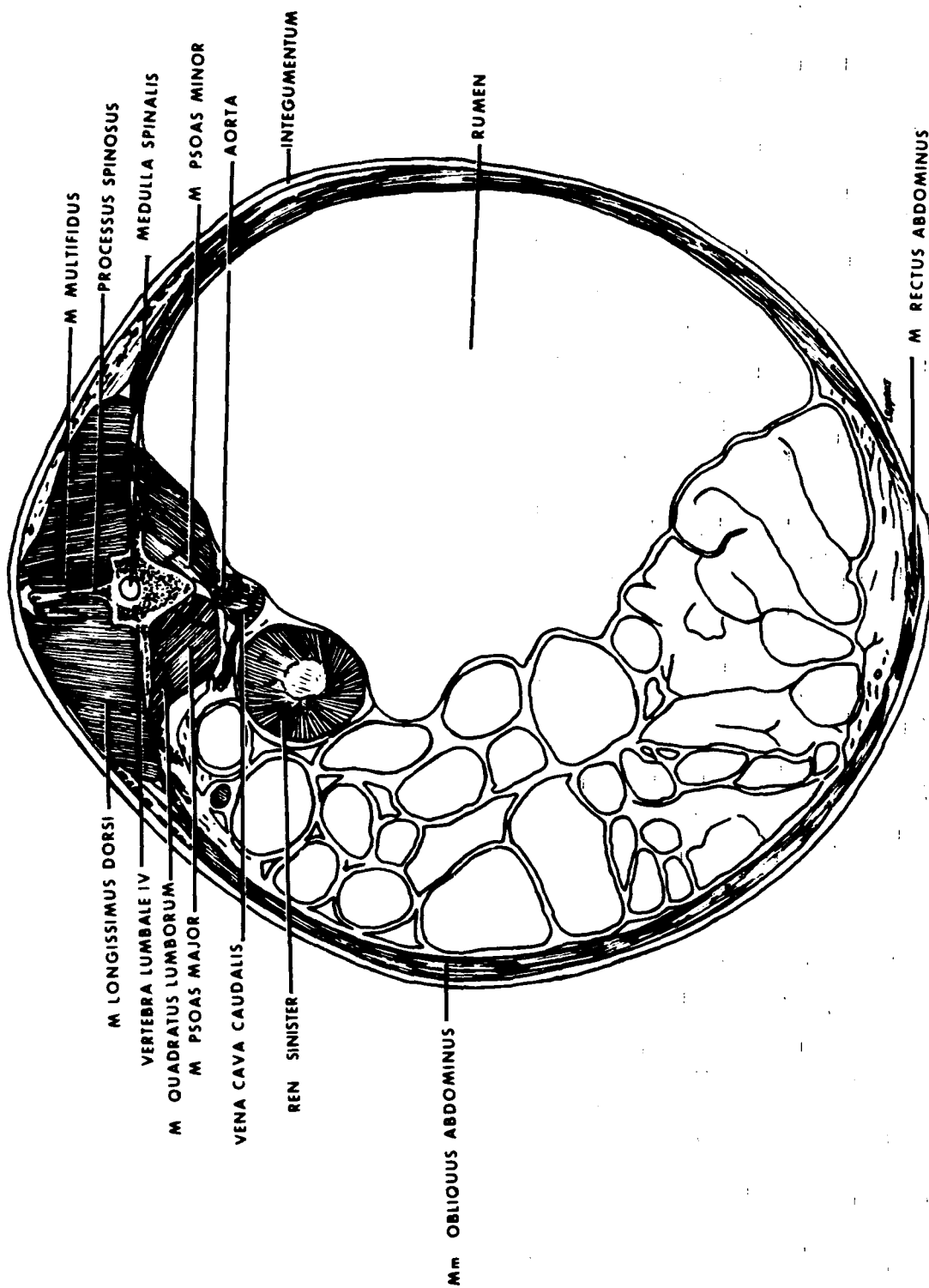
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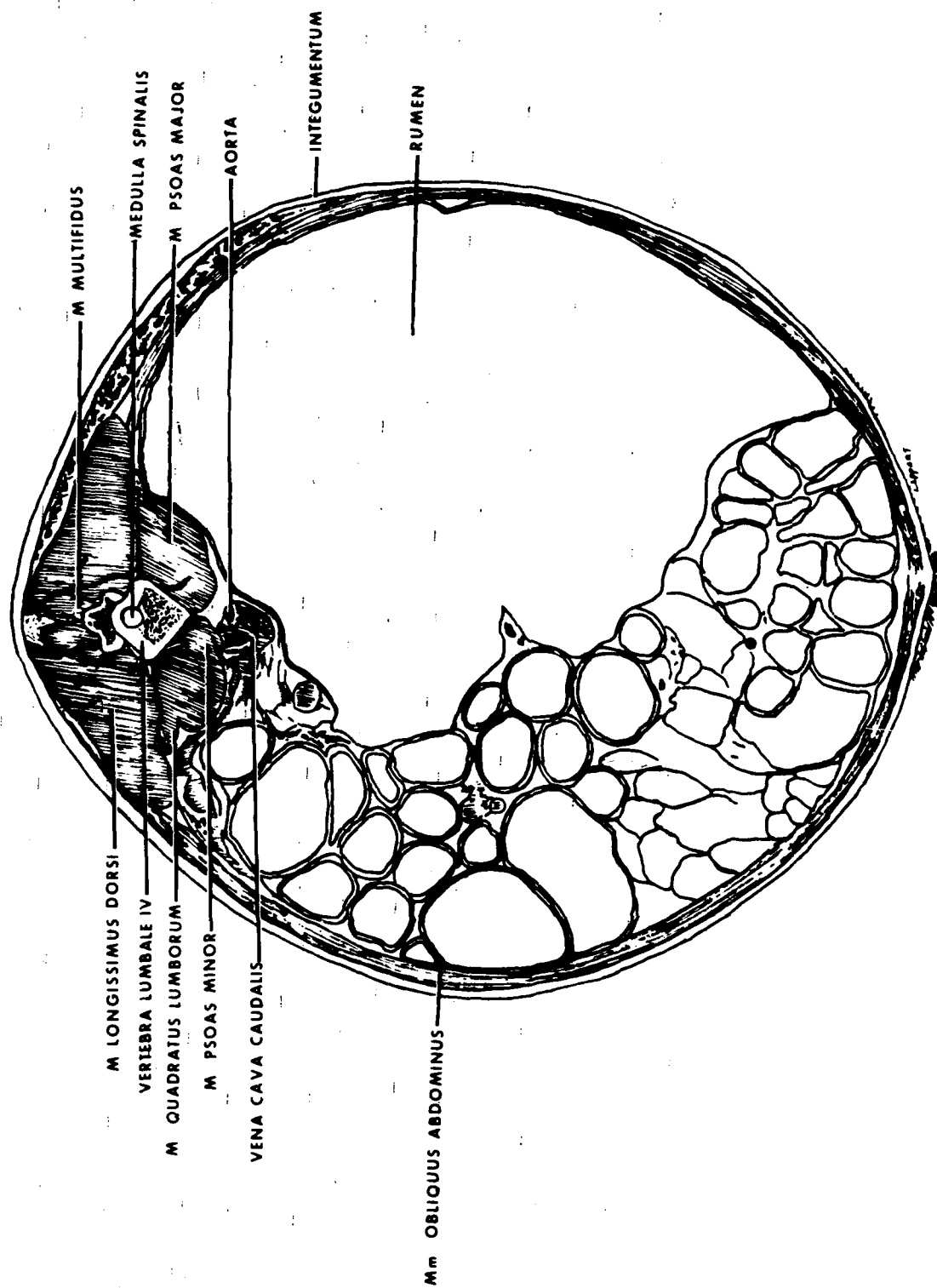
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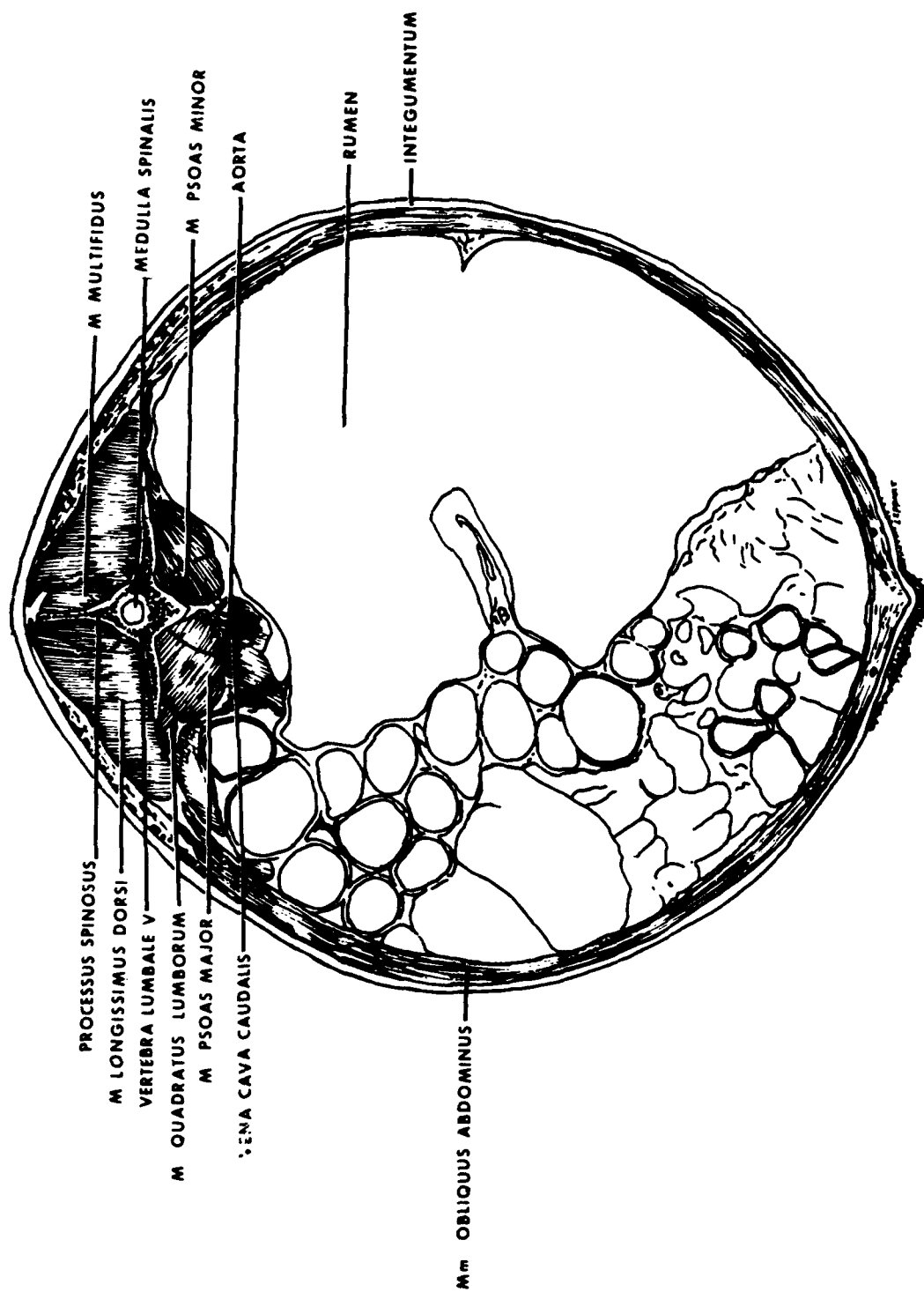
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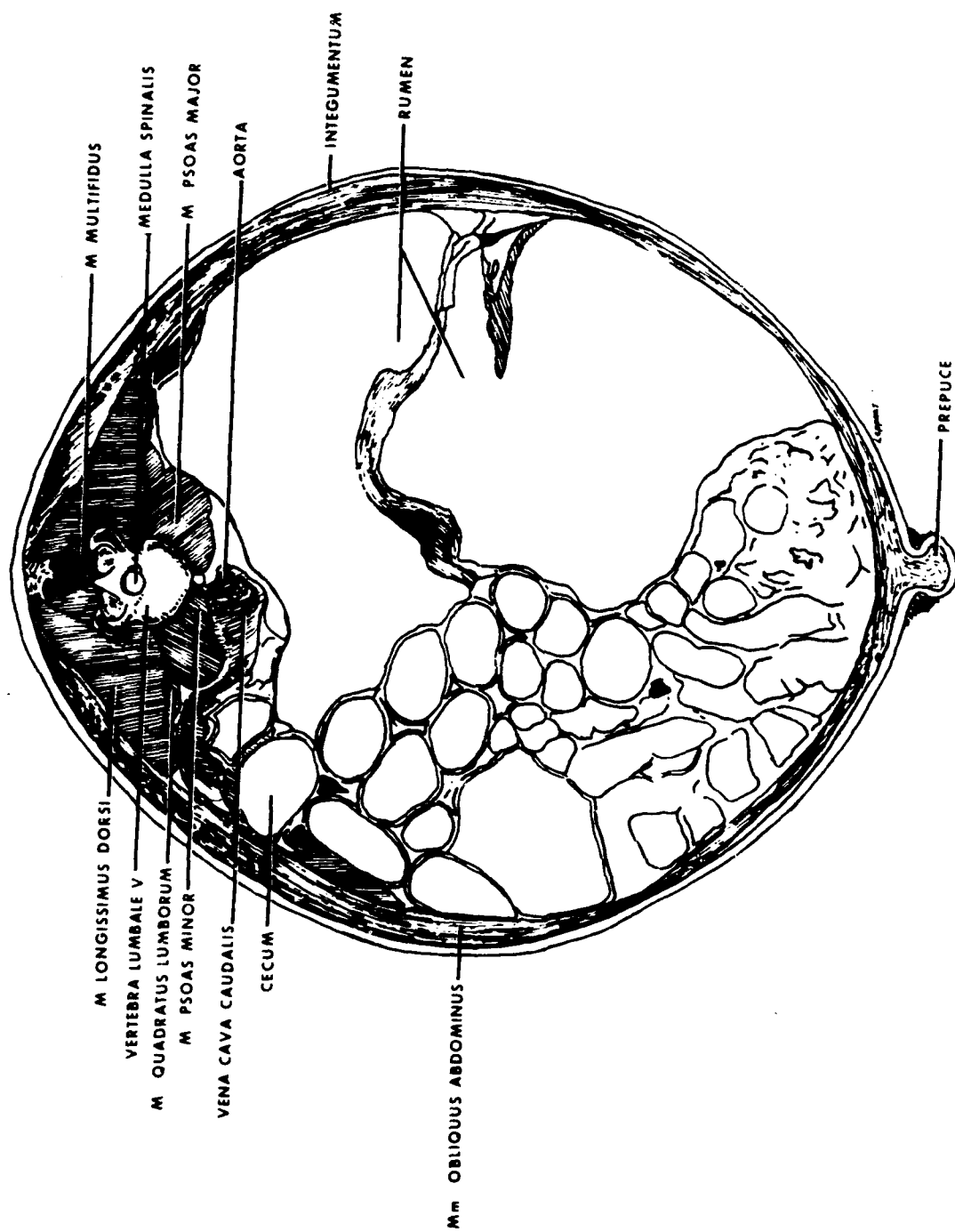
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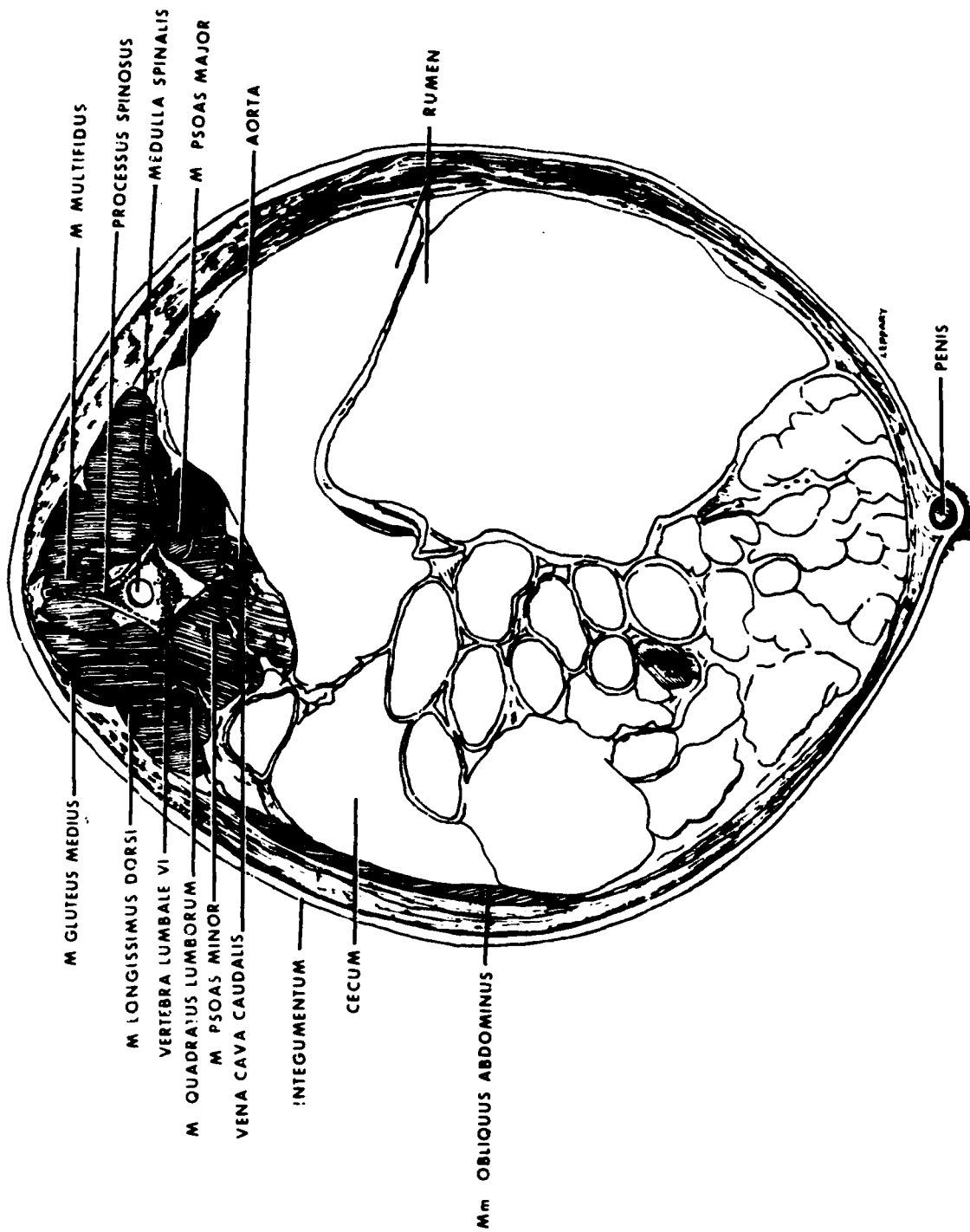
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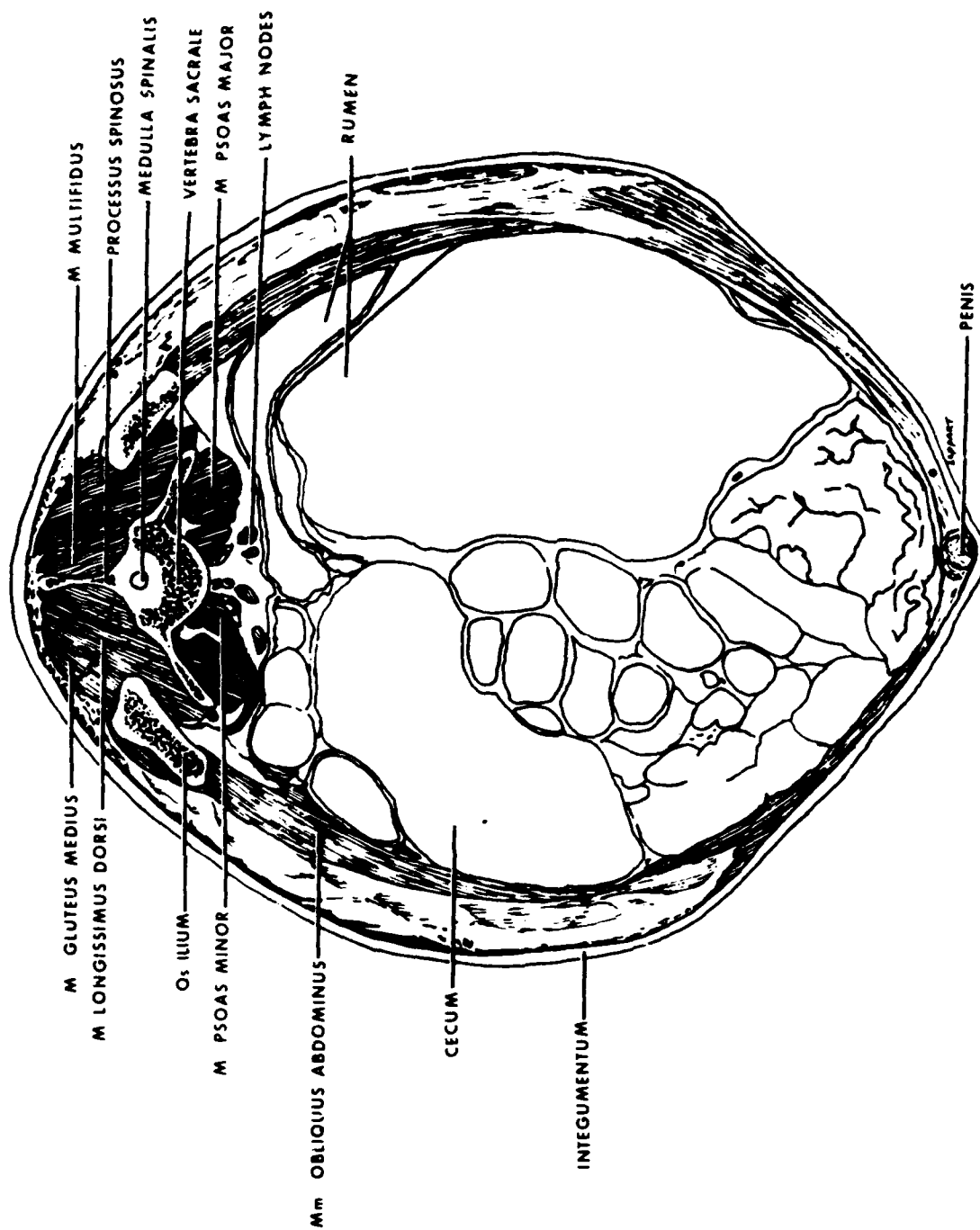
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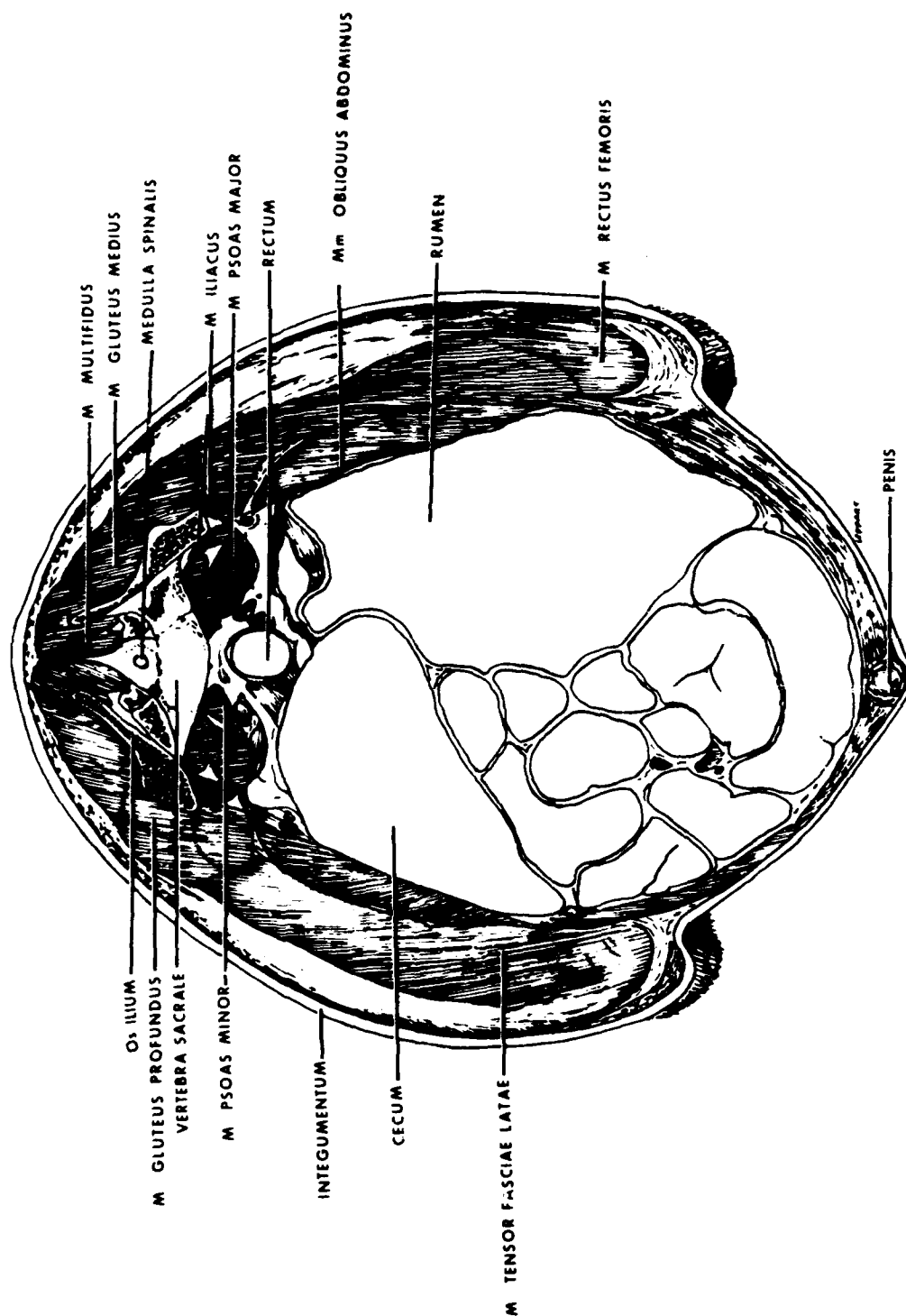


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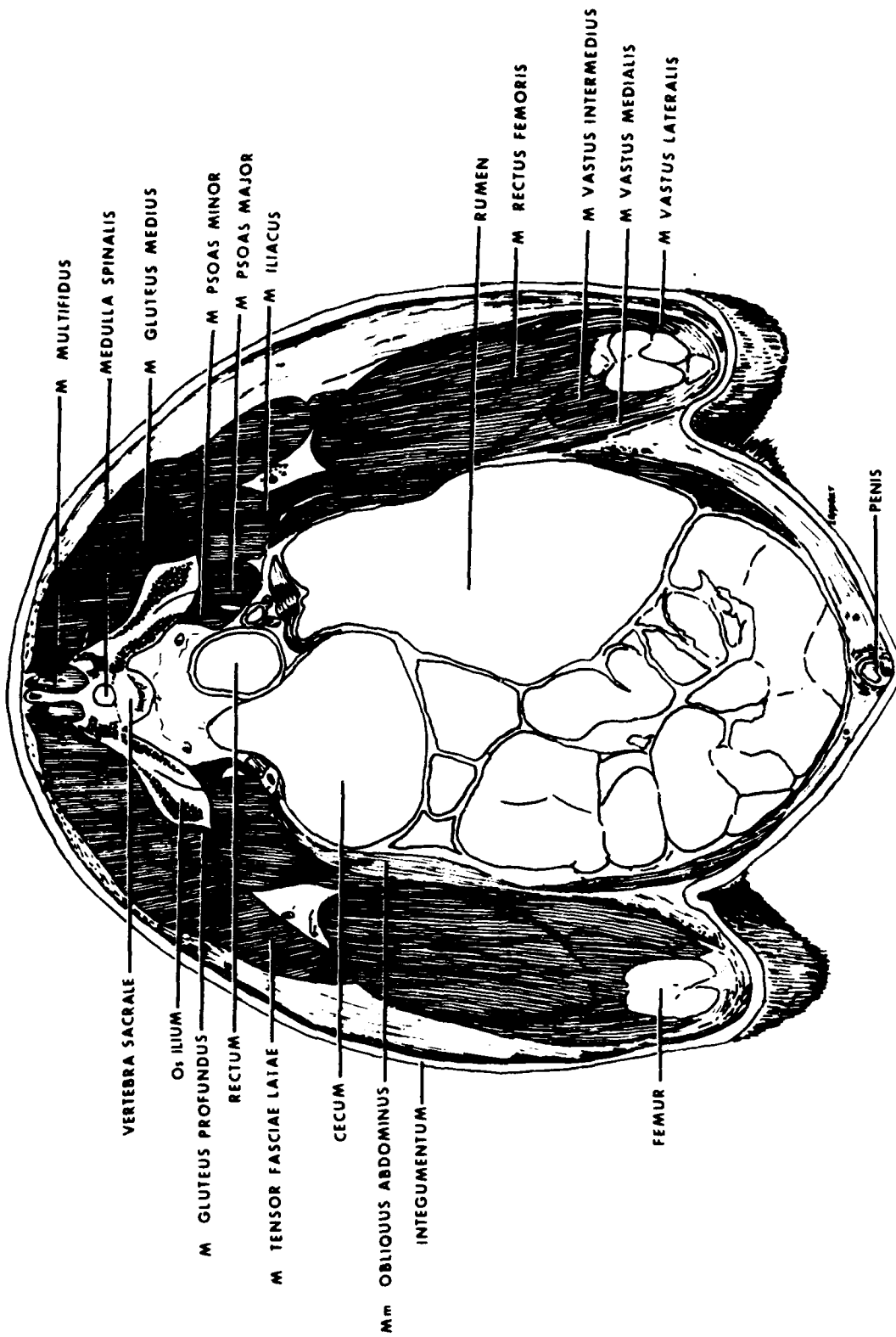


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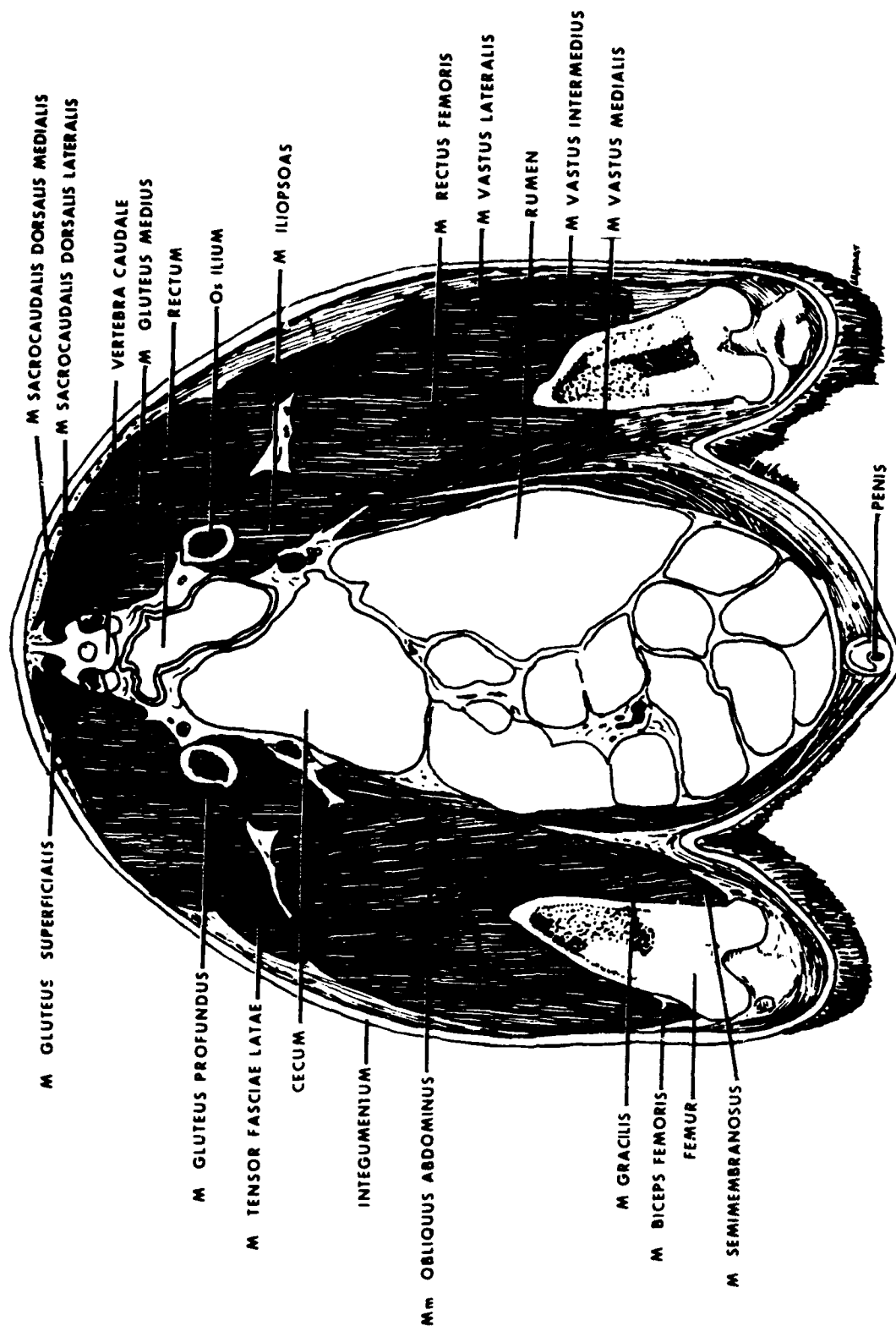
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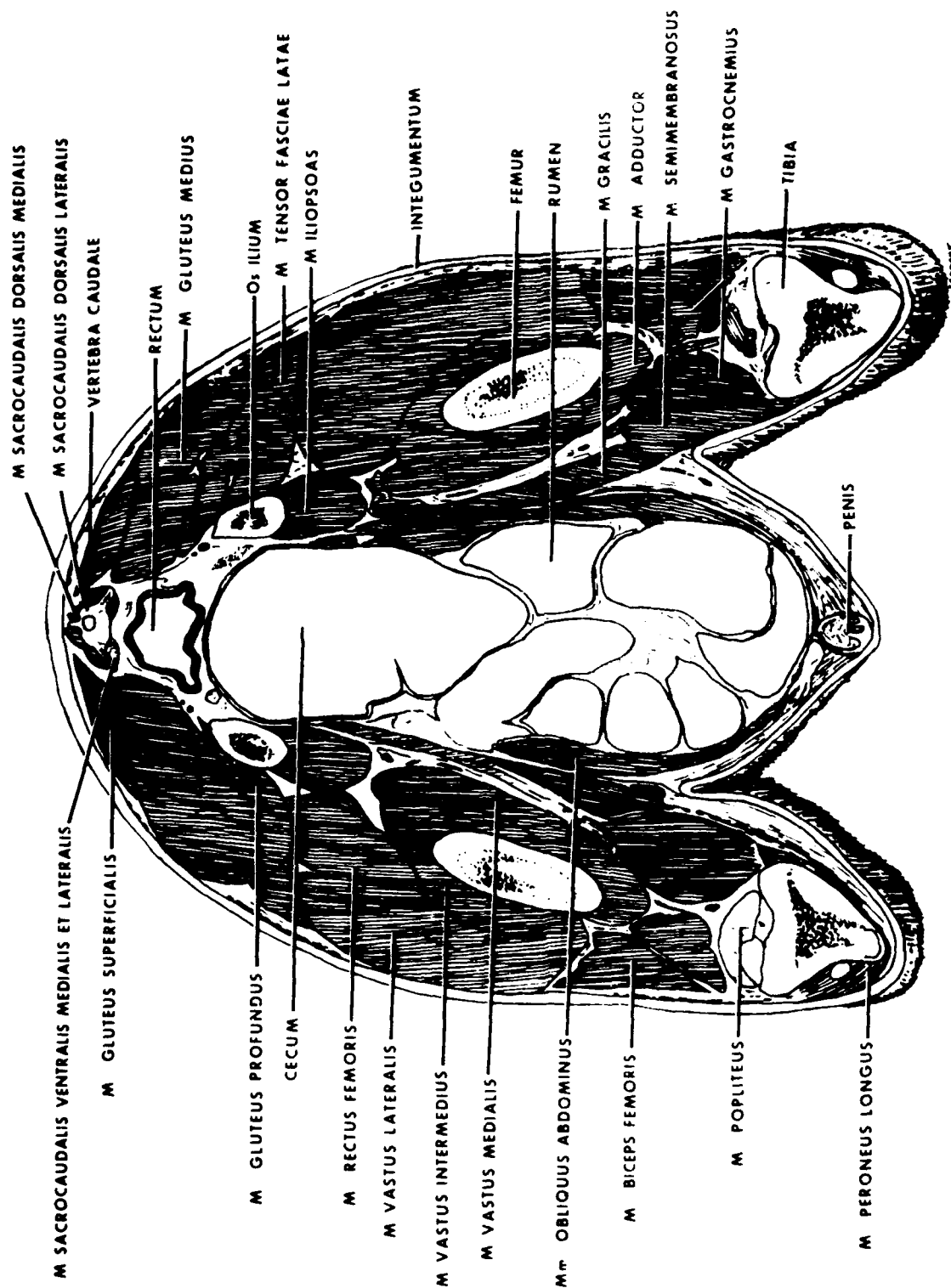
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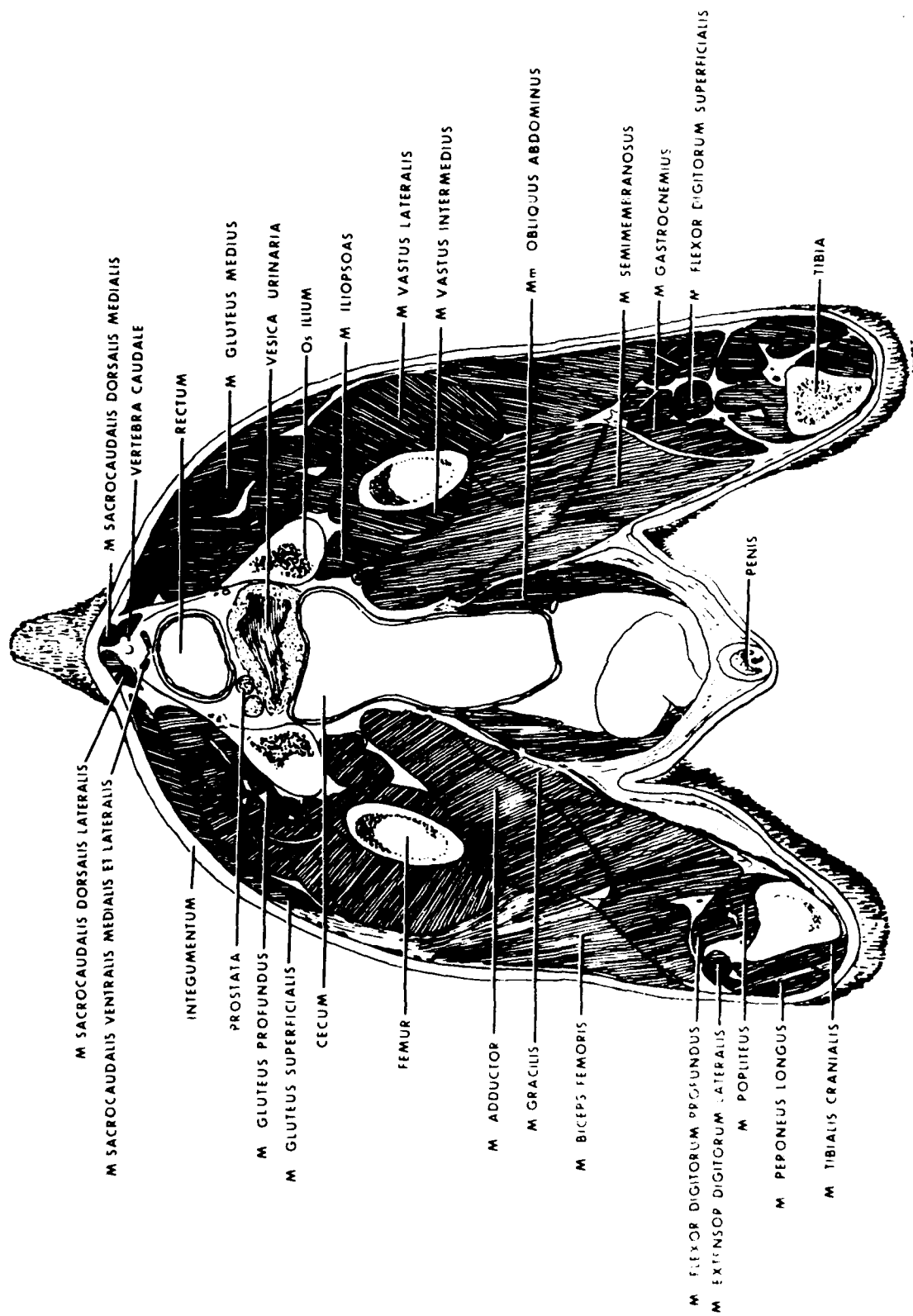
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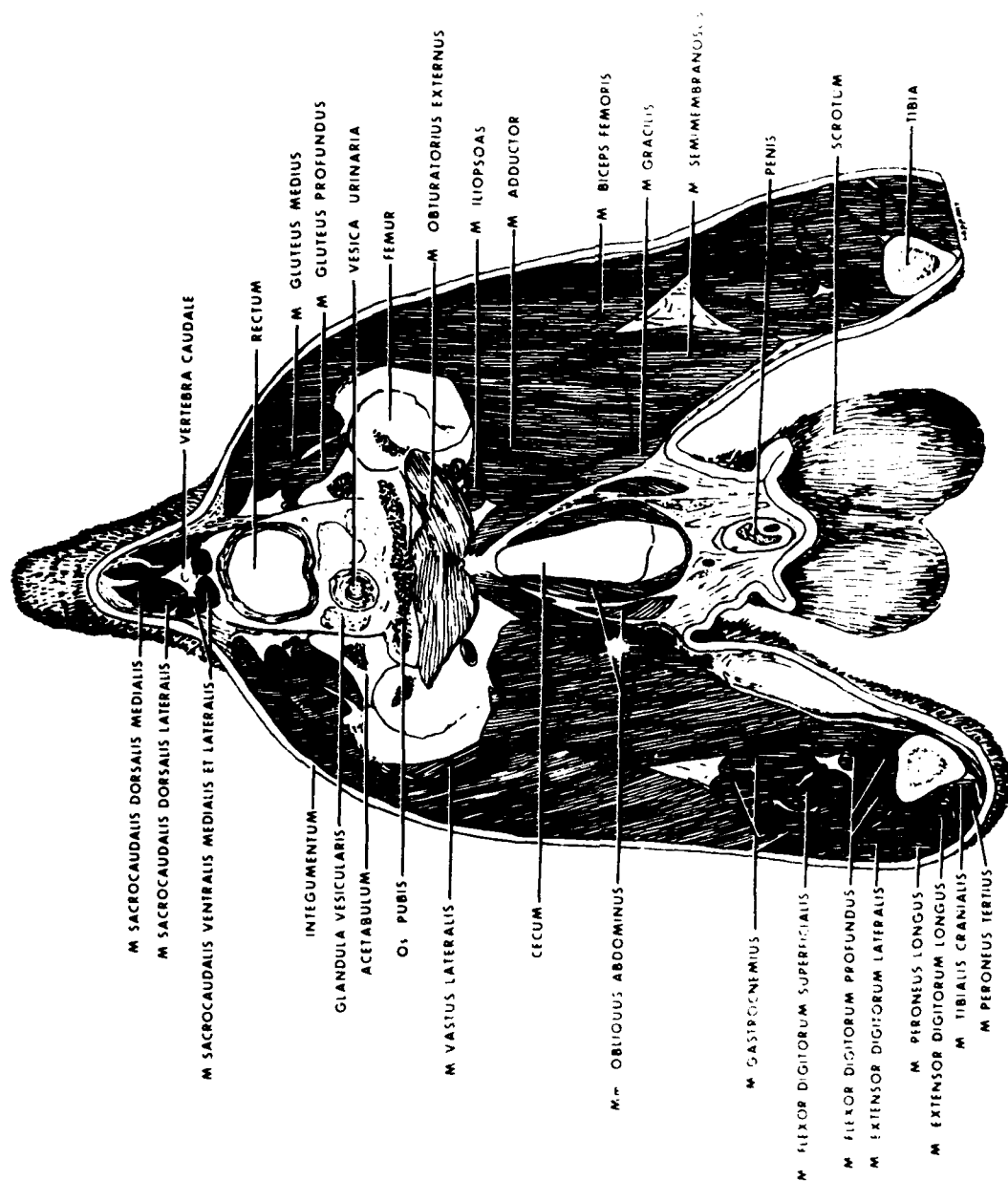
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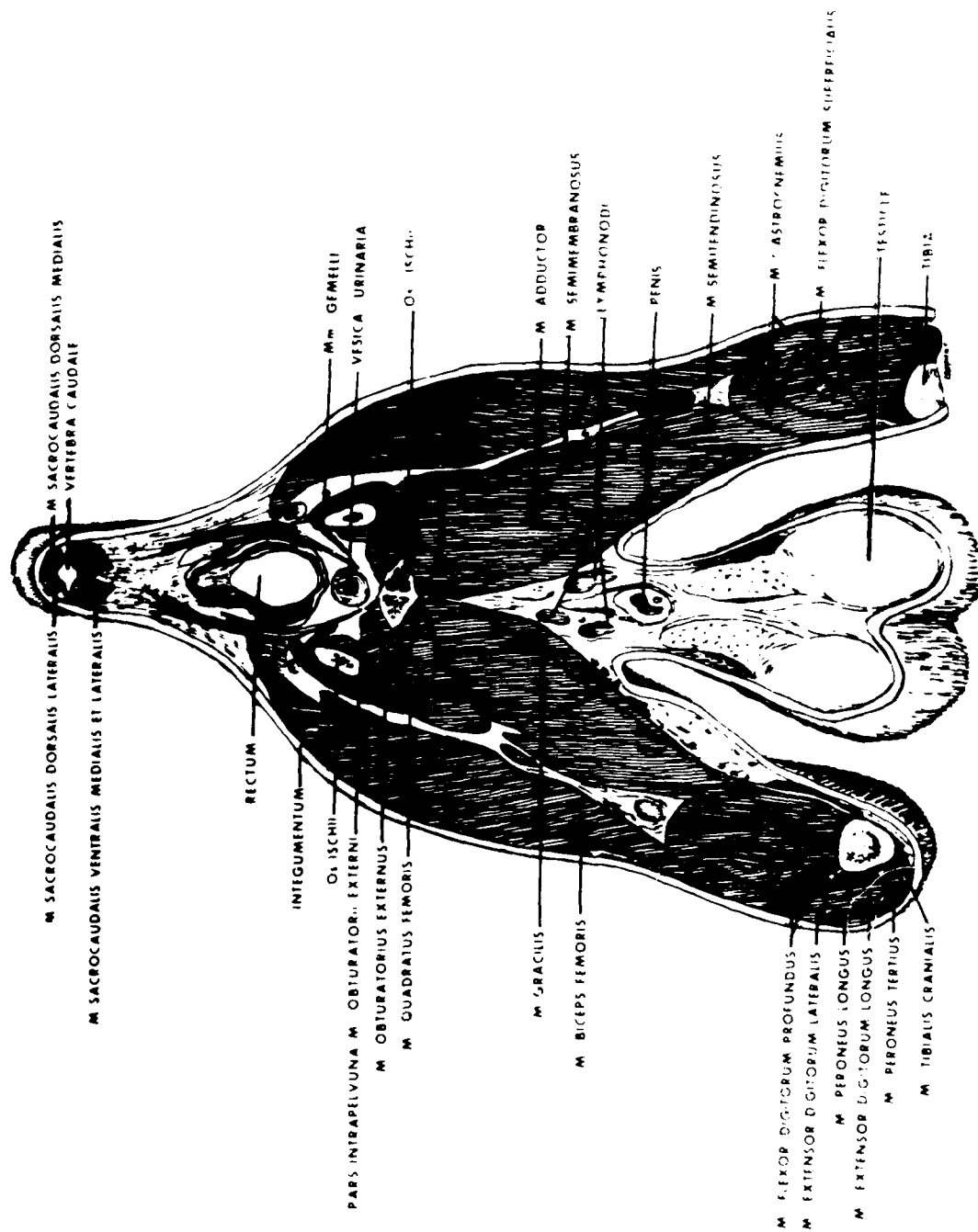
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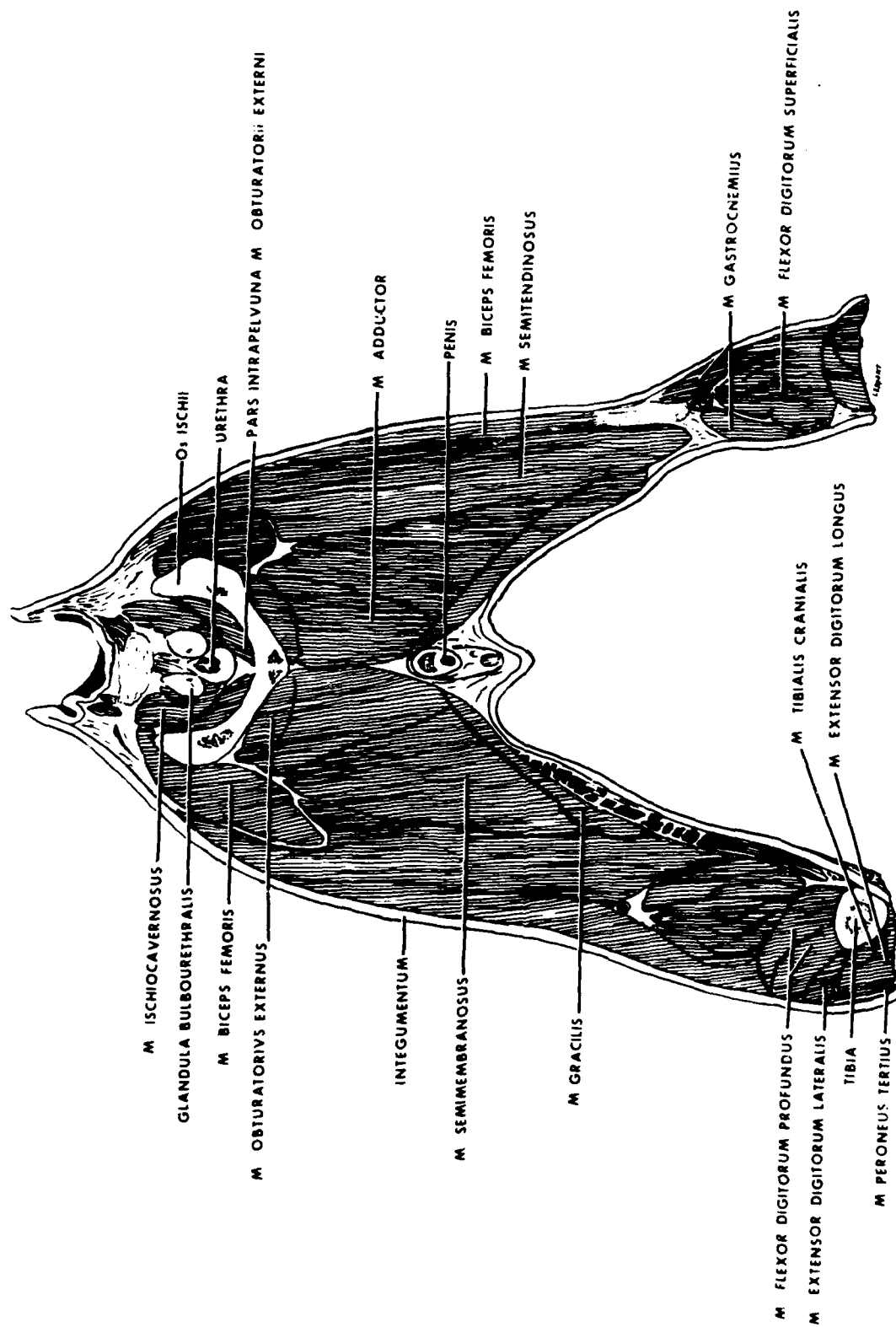
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